CONTRIBUTIONS TOWARD A

FLORA OF NEVADA. NO. 1.

- - -

GRAMINEAE OF NEVADA.

by

JASON R. SWALLEN

July 1, 1940.

Issued by

The Division of Plant Exploration and Introduction,
Bureau of Plant Industry,
U. S. Department of Agriculture,
Washington, D. C.

- - -

Works Projects Administration of Nevada,
Projects, O. P. 65-2-04-13, W. P. 658;
O. P. 165-2-04-21, W. P. 752.

- - -

Collaborator

University of Nevada.

Address all queries concerning this publication to the Division of Plant Exploration and Introduction, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D. C.

GRAMINEAE OF NEVADA.

By Jason R. Swallen

Flowers perfect or sometimes unisexual arranged in spikelets, these consisting of a short axis (rachilla) and 2 to many 2-ranked bracts, the lower two (glumes) empty, the succeeding ones (lemmas) bearing in their axils a single flower, and between the flower and the rachilla a 2-nerved bract (palea), the lemma, palea, and included flower constituting the floret; stamens 1 to 6, the anthers 2-celled; pistil 1, with 2 (rarely 1 or 3) styles, and usually plumose stigmas; spikelets mostly aggregate in spikes or panicles at ends of the main culms and branches.

Herbs (woody in Arundo) with hollow or solid stems (culms) closed at the nodes, and 2-ranked parallel veined leaves, composed of a sheath which encloses the culm, and a blade, with a hairy or membranaceous appendage (ligule) between them on the inside.

KEY TO GENERA

1. Spikelets in groups of 3 to 5, the groups erect on the stiff axis, falling entire; rigid perennials - 39. HILARIA. (p. 80)

1. Spikelets not arranged in groups.

  2. Spikelets more or less laterally compressed; sterile florets, if any, above the fertile ones (except in Phalarideae with two sterile or staminate florets below the fertile); articulation above the glumes (except in Sphenopholis, Trisetum,

Polypogon, Alopecurus, Spartina, and Beckmannia)

(Festucoideae)

3. Spikelets with two sterile florets below the fertile one, these reduced to small scales - - - 47. PHALARIS. (p. 85)

3. Spikelets with no sterile florets below the one or more fertile florets.

4. Spikelets sessile or subsessile in spikes or spikelike racemes.

5. Spikelets on opposite sides of the continuous or disarticulating rachis (Hordeae)

6. Spikelets more than one at each node of the rachis.

7. Spikelets 2 at each node of the rachis.

8. Rachis usually continuous; glumes acute to aristate, entire - - - - - - - 16. ELYMUS. (p. 46)

8. Rachis readily disarticulating; glumes narrow, extending into long divergent awns.

17. SITANION. (p. 49)

7. Spikelets 3 at each node of the rachis, 1-flowered, the lateral ones usually reduced to awns.

18. HORDEUM. (p. 51)

6. Spikelets solitary at each node of the rachis.

9. First glume wanting except on the terminal spikelet; spikelets placed edgewise to the rachis.

19. LOLIUM. (p. 52)

9. First glume present; spikelets placed flatwise to the rachis - - - - - - - - 15. AGROPYRON. (p. 43)

Polymers, Aromatics, Spectra, and Mechanisms

(Structures)

4. Calculate with the electric filments below the Debye temperature reduces to small values - - - 44. TOLUENE. (p. [illegible])

5. Spirals with no electric filments below the or zero free-flux flow.

6. Spiralate results or successive in milder or spiralize reactions.

7. Spiralate on operate sides of it continuous or alternating reacts (Isomer)

8. Spiralate zero that one at zero rate of the reacts.

9. Spiralate 2 at each node of the reacts.

10. Reacts usually continuous; always reacts to spiralize, solve - - - - - - - - 16. RICHES. (p. 49)

11. Reacts freely electrolitically; always matter, exciting into line diverges at zero.

12. STRAIGHT. (p. 49)

13. Spiralate 3 at each node of the reacts, 1-fixered, the latter does usually reduce [illegible].

14. SCHEME. (p. 51)

15. Eliminate military at each node of the reacts.

16. First class working has at zero (origins) always; spiralate fixed [illegible] reacts.

17. [illegible] TOLUENE. (p. 52)

18. First class permanent, spiralate [illegible] fixered, so the reacts - - - - - - - - 19. [illegible]. (p. 52)

5. Spikelets subsessile on one side of a continuous rachis, the spikes digitate or racemose on a common axis (Chlorideae)

10. Inflorescence very small, enclosed in the broad, crowded sheaths at the ends of the branches.

46. MUNROA. (p. 85)

10. Inflorescence distinctly exserted.

11. Spikelets 1-flowered with no rudimentary florets above the perfect one.

12. Spikes digitate - - - - - - 41. CYNODON. (p. 81)

12. Spikes racemose.

13. Glumes unequal, the first shorter, the second longer than the floret.

43. SPARTINA. (p. 82)

13. Glumes equal, saccate, slightly shorter than the floret - - - - - 42. BECKMANNIA. (p. 81)

11. Spikelets 2- to several-flowered, or if only 1-flowered then with one or more rudimentary florets above the fertile one.

14. Spikes digitate or aggregate on a very short axis - - - - - - - - - - - - 44. CHLORIS. (p. 83)

14. Spikes racemose.

15. Lemmas entire or minutely bifid, awnless or 1-awned; spikelets with 2 to several perfect florets - - - - - - - 40. LEPTOCHLOA. (p. 80)

15. Lemmas variously lobed or dentate, 3-awned; spikelets with one perfect floret and one or two rudimentary florets above it.

45. BOUTELOUA. (p. 83)

4. Spikelets in open or spikelike panicles.

16. Spikelets 1-flowered (Agrostideae)

17. Fruit indurate, terete, awned; callus well developed, oblique, bearded.

18. Awn trifid, the lateral awns sometimes minute.

38. ARISTIDA. (p. 78)

18. Awn simple with a distinct line of demarcation between the lemma and the awn.

19. Awn persistent, twice-geniculate, at least the lower segment tightly twisted.

37. STIPA. (p. 75)

19. Awn readily deciduous, straight or sometimes bent but not tightly twisted.

36. ORYZOPSIS. (p. 73)

17. Fruit thin or firm but not indurate; callus not well developed.

20. Callus bearded - - - - - 28. CALAMAGROSTIS. (p. 59)

20. Callus not bearded.

21. Panicles narrow, dense, spikelike.

22. Glumes similar, enclosing the floret, equal, united at the base; articulation below the glumes, the spikelets falling entire.

23. Glumes abruptly awned, hispid-ciliate on the keels - - - - - - - - - - 33. PHLEUM. (p. 65)

23. Glumes awnless, pubescent or villous but not hispid-ciliate on the keels.

31. ALOPECURUS. (p. 64)

22. Glumes dissimilar, usually unequal, not united at the base; articulation above the persistent glumes.

24. Lemma 3-nerved, awned from the tip or mucronate - - - - - - 34. MUHLENBERGIA. (p. 66)

24. Lemma 1-nerved, awnless.

35. SPOROBOLUS. (p. 71)

21. Panicles open or dense but scarcely spikelike (except in Polypogon monspeliensis with long-awned glumes).

25. Glumes longer than the lemma.

26. Lemma and palea much thinner than the glumes, the lemma awnless or awned from the back.

27. Glumes long-awned; palea nearly as long as the lemma - - - - 32. POLYPOGON. (p. 65)

27. Glumes awnless; palea much shorter than the lemma, sometimes reduced to a small nerveless scale - - 29. AGROSTIS. (p. 61)

26. Lemma and palea similar to the glumes in texture, lemma minutely awned from between the teeth of a bifid apex - 30. CINNA. (p. 64)

25. Glumes shorter than the lemma.

23. Lemma awned from the tip or mucronate, 3-nerved - - - - - 34. MUHLENBERGIA. (p. 66)

28. Lemma awnless, 1-nerved.

35. SPOROBOLUS. (p. 71)

16. Spikelets 2- to several-flowered.

29. Glumes longer than the lowest floret, usually longer than the spikelet (or shorter in Sphenopholis with broadly obovate second glume); lemmas awnless or awned from the back (Aveneae)

30. Lemmas awnless (sometimes with a very short awn in Koeleria)

31. Glumes alike, gradually acuminate; spikelets 5- to 6-flowered - - - - - - 20. SCHISMUS. (p. 53)

31. Glumes unlike, the first narrow, the second wider than the lower, broadened above the middle, spikelets 2- to 3-flowered.

32. Second glume broadened above the middle, then abruptly narrowed to an acute tip, the first glume narrower but not conspicuously so; lemmas pale and shining; spikelets articulate above the glumes - - - 21. KOELERIA. (p. 53)

32. Second glume broadly obovate, obtuse; lemmas firm, not shining; spikelets articulate below the glumes - - - - 22. SPHENOPHOLIS. (p. 54)

30. Lemmas awned.

33. Florets 2, the lower perfect, awnless, the upper staminate with a short hooked awn.

26. HOLCUS. (p. 58)

33. Florets all alike.

34. Spikelets several-flowered; awns conspicuous, flat, bent - - - - - - 27. DANTHONIA. (p. 58)

34. Spikelets 2-flowered, sometimes with a rudimentary third floret.

35. Spikelets large, the glumes more than 1 cm. long - - - - - - - - - - 25. AVENA. (p. 57)

35. Spikelets small, the glumes much less than 1 cm. long.

36. Lemmas keeled, awned from above the middle, the tip minutely bifid.

23. TRISETUM. (p. 55)

36. Lemmas rounded on the back, awned from below the middle, the tip erose.

24. DESCHAMPSIA. (p. 56)

29. Glumes shorter than the first floret; lemmas awnless or awned from the tip or from a minutely bifid apex (Festuceae)

37. Plants dioecious, the pistillate lemmas with 3 long, twisted, divergent awns, the staminate lemmas mucronate - - - - - 14. SCLEROPOGON. (p. 42)

37. Plants with perfect flowers, or if dioecious the staminate and pistillate spikelets similar in appearance.

38. Tall stout reeds with plume-like panicles, rachilla hairy - - - - - 10. PHRAGMITES. (p. 38)

38. Low or rather tall grasses; the panicles not plumelike.

39. Plants dioecious, the staminate and pistillate similar in appearance. Culms erect from creeping rhizomes; plants of alkaline soil. 8. DISTICHLIS. (p. 37)

39. Plants with perfect flowers.

40. Lemmas 3-nerved, the nerves usually prominent.

41. Lemmas awnless, glabrous.

42. Spikelets 3- to several-flowered; lemmas acute or acuminate. 6. ERAGROSTIS. (p. 35)

42. Spikelets 2-flowered; lemmas truncate, strongly nerved, brown. 7. CATABROSA. (p. 37)

41. Lemmas awned, or if awnless then pilose on the nerves.

43. Lobes of lemma conspicuously ciliate; upper floret reduced to a 3-awned rudiment; first and second florets sterile. 13. BLEPHARIDACHNE. (p. 42)

43. Lobes of lemma not ciliate; upper floret reduced but not to awns; all florets perfect - - - - - 12. TRIODIA. (p. 40)

40. Lemmas 5-nerved.

44. Lemmas awnless, usually rounded on the back.

45. Glumes papery; upper florets reduced to a club-shaped rudiment. Spikelets nodding, falling entire.

11. MELICA. (p. 39)

45. Glumes not papery; upper florets similar to the lower ones.

46. Nerves of lemma parallel, not converging toward the summit.

47. Nerves prominent; plants of fresh water marshes - 4. GLYCERIA. (p. 25)

47. Nerves faint; plants usually in saline soil - 3. PUCCINELLIA. (p. 24)

46. Nerves of lemma converging toward the summit. Blades with boat-shaped tips - - - - - - - - 5. POA. (p. 27)

44. Lemmas mucronate or awned, keeled at least toward the summit.

48. Spikelets densely clustered toward the ends of the branches; glumes hispid-ciliate on the keel.

9. DACTYLIS. (p. 38)

48. Spikelets not clustered, rather evenly distributed in narrow or open panicles.

49. Lemmas awned from between the teeth of the minutely bifid apex.

1. BROMUS. (p. 12)

49. Lemmas awnless or awned from the tip.

2. FESTUCA. (p. 19)

2. Spikelets dorsally compressed, with one terminal fertile floret and a sterile or staminate floret below, the latter usually without a palea; articulation below the spikelets, in the pedicel, the rachis, or at the base of a cluster of spikelets (Panicoideae)

50. Fertile lemma and palea firmer than the glumes, usually indurate (Paniceae)

51. Spikelets subtended by one or more bristles, these distinct or united at the base forming an involucre or spiny bur.

52. Bristles distinct, persistent, the spikelets deciduous.

52. SETARIA. (p. 89)

52. Bristles united at the base, deciduous, falling with the enclosed spikelets - - - - 53. CENCHRUS. (p. 90)

51. Spikelets not subtended by bristles.

53. Spikelets short pedicelled on one side of the panicle branches.

54. Second glume mucronate, the sterile lemma mucronate or awned - - - - - - - - - - 51. ECHINOCHLOA. (p. 89)

54. Second glume and sterile lemma awnless.

55. Racemes digitate - - - - - - 48. DIGITARIA. (p. 86)

55. Racemes panicled - - - - - - 49. PASPALUM. (p. 87)

53. Spikelets in open panicles - - - - 50. PANICUM. (p. 87)

50. Fertile lemma and palea thin, hyaline, the glumes indurate. Sterile lemma like the fertile. Spikelets in pairs, one sessile, the other pedicellate, both fertile, or the sessile perfect and the pedicellate one sterile or staminate, sometimes much reduced (Andropogoneae)

56. Spikelets awnless, all alike, in a narrow, silky panicle. 54. IMPERATA. (p. 90)

56. Spikelets awned, the sessile one perfect, the upper one staminate or sterile - - - - - 55. ANDROPOGON. (p. 91)

1. BROMUS L.

Annuals or perennials with closed sheaths, flat blades, and open or sometimes rather dense panicles; lemmas keeled or usually rounded on the back, the margins not clasping the palea, awned from between the teeth of the minutely bifid apex; palea thin, ciliate on the keels, usually shorter than the lemma, adhering to the caryopsis.

1. Spikelets conspicuously flattened, the glumes and lemmas compressed keeled.
    2. Lemmas awnless or nearly so, light green, the margins usually pale - - - - - - - - - - - - - - - - 1. B. CATHARTICUS.
    2. Lemmas distinctly awned, dark green throughout.
        3. Leaves densely softly pubescent, almost velvety, the blades narrow, short, becoming involute, erect or ascending - - - - - - - - - - - 2. B. BREVIARISTATUS.
        3. Leaves glabrous or sparsely pilose, the blades flat, 3-8 mm. wide, spreading.
            4. Awns more than 7 mm. long - - - - - 3. B. CARINATUS.
            4. Awns less than 7 mm., usually about 5 mm. long.
                5. Sheaths and lemmas pubescent - 4. B. MARGINATUS.
                5. Sheaths glabrous, the lemmas glabrous or scabrous - - - - - - - - - - - 5. B. POLYANTHUS.

1. Spikelets not conspicuously flattened, the lemmas rounded on the back.

6. Rhizomes present; lemmas awnless or nearly so.

6. B. INERMIS.

6. Rhizomes wanting.

7. Plants perennial.

8. Lemmas densely pubescent or ciliate on the margins, sometimes sparsely pubescent on the internerves toward the base, the upper dorsal portion glabrous.

9. Panicles narrow, the short branches erect or ascending - - - - - - - - - - 7. B. SUKSDORFII.

9. Panicles open, nodding, the slender branches drooping, naked toward the base.

10. First glume 1-nerved; ligule inconspicuous, about 1 mm. long - - - 8. B. CILIATUS.

10. First glume 3-nerved; ligule 2-3 mm. long. Culms decumbent at the base.

9. B. LAEVIPES.

8. Lemmas evenly pubescent across the back, the pubescence sometimes sparse. Panicles less than 10 cm. long with lax, few-flowered branches.

10. B. ANOMALUS.

7. Plants annual.

11. Lemmas broad, rather abruptly narrowed above the middle to a firm, subacute tip.

12. Lemmas awnless - - - - - - 11. B. BRIZAEFORMIS.

12. Lemmas awned.

13. Sheaths glabrous; lemmas glabrous, the margins inrolled exposing the rachilla at maturity - - - - - 12. B. SECALINUS.

13. Sheaths pubescent; lemmas glabrous or pubescent, the margins scarcely inrolled obscuring the rachilla.

14. Panicles open, the branches spreading or drooping. Spikelets glabrous.

15. Panicle branches stiffly spreading, not flexuous; awn straight, rather coarse.

13. B. COMMUTATUS.

15. Panicle branches slender, drooping, more or less flexuous.

16. Lemmas glabrous; panicle branches spreading or drooping but not conspicuously flexuous. Awn somewhat divergent at maturity.

14. B. JAPONICUS.

16. Lemmas pubescent; panicle branches and pedicels conspicuously flexuous.

15. B. ARENARIUS.

14. Panicles narrow, dense, the branches short, erect or ascending. Spikelets glabrous - - 16. B. RACEMOSUS.
Spikelets pubescent - 17. B. MOLLIS.

11. Lemmas narrow, compressed, lanceolate or acuminate, deeply cleft at the apex.

17. Awn straight; teeth of lemma hyaline, not aristate.

18. Panicles open, the branches spreading or drooping.

19. Pedicels capillary, flexuous; second glume 8-10 mm. long; lemmas 10-12 mm. long - - - - - 18. B. TECTORUM.

19. Pedicels relatively stout, usually straight; second glume 2.5-3 cm. long; lemmas 2.5-3 cm. long.
19. B. RIGIDUS.

18. Panicles compact, the short branches erect. Culms pubescent below the panicle.
20. B. RUBENS.

17. Awn geniculate, twisted, strongly divaricate at maturity; teeth of lemma aristate.
21. B. TRINII.

*1. BROMUS CATHARTICUS Vahl, Symb. Bot. 2: 22. 1791.

A weed in waste places; southern United States, the West Indies and western South America; introduced from Europe.

*2. BROMUS BREVIARISTATUS Buckl., Acad. Nat. Sci. Phila. Proc. 1862: 98. 1862.

Bromus subvelutinus Shear, U. S. Dept. Agr., Div. Agrost. Bull. 23: 52. 1900.

Dry wooded hills and meadows, Wyoming to eastern Washington, south to Arizona and California.

3. BROMUS CARINATUS Hook. & Arn., Bot., Beechey Voy. 403. 1840.

Open ground, open woods and waste places; British Columbia, Idaho, and Montana to New Mexico, California and northern Mexico.

*4. BROMUS MARGINATUS Nees; Steud., Syn. Pl. Glum. 1: 322. 1854.

Roadsides, moist meadows, and rocky hills, sometimes common; British Columbia to Colorado and south to northern Mexico.

*5. BROMUS POLYANTHUS Scribn.; Shear, U. S. Dept. Agr., Div. Agrost. Bull. 23: 56. 1900.

Moist meadows; Montana to eastern Oregon, south to Colorado, New Mexico and California.

*6. BROMUS INERMIS Leyss., Fl. Hal. 16. 1761.

Escaped from cultivation from Minnesota and Kansas to eastern Washington and Oregon and occasionally eastward; introduced.

- -

* The asterisk indicates species known to occur in Washoe County.

*7. BROMUS SUKSDORFII Vasey, Bot. Gaz. 10: 223. 1885.

Moist mountain meadows, rocky woods and slopes, Washington to Nevada (Lake Tahoe) and the southern Sierra Nevada of California.

8. BROMUS CILIATUS L., Sp. Pl. 1: 76. 1753.

Bromus richardsoni Link, Hort. Berol. 2: 281. 1833.

Moist woods and rocky slopes; Labrador to Alaska, south to Tennessee, Iowa, western Texas, and southern California.

9. BROMUS LAEVIPES Shear, U. S. Dept. Agr., Div. Agrost. Bull. 23: 45. 1900.

Moist woods and shady banks, southern Washington to California, Nevada (Charleston Mountains), and Arizona (Tanner Canyon).

10. BROMUS ANOMALUS Rupr.; Fourn., Bull. Acad. Sci. Brux. 9(2): 236. 1840.

Bromus porteri (Coult.) Nash, Bull. Torrey Bot. Club 22: 512. 1895.

Open woods; Saskatchewan and Idaho to western Texas, California and Mexico.

*11. BROMUS BRIZAEFORMIS Fisch. and Mey., Ind. Sem. Hort. Petrop. 3: 30. 1837.

Sandy fields and waste ground, occasional from Washington and Idaho to California, rare eastward to Massachusetts and Delaware; introduced from Europe.

12. BROMUS SECALINUS L., Sp. Pl. 76. 1753.

A common weed in fields and waste places throughout the

United States; introduced from Europe.

*13. BROMUS COMMUTATUS Schrad., Fl. Germ. 353. 1806.

Fields and waste places throughout the United States; introduced from Europe.

*14. BROMUS JAPONICUS Thunb., Fl. Japon. 52. 1784.

A common weed in waste places, Vermont to Washington, south to North Carolina and California.

15. BROMUS ARENARIUS Labill., Nov. Holl. Pl. 1: 23. pl. 28. 1804.

Sandy roadsides and rocky hills, Oregon, Nevada, and California; introduced from Australia.

*16. BROMUS RACEMOSUS L., Sp. Pl. ed. 2. 1: 114. 1762.

Waste places, Washington to Idaho and Colorado, south to Arizona and California, rare eastward; introduced from Europe.

*17. BROMUS MOLLIS L., Sp. Pl. ed. 2. 1: 112. 1762.

A weed in fields and waste places, Montana and Washington to Arizona and California, common on the Pacific coast; Maine to South Dakota, south to Delaware and Missouri; introduced from Europe. (As B. hordeaceus L., in Tidestrom, Flora of Utah and Nevada).

*18. BROMUS TECTORUM L., Sp. Pl. 77. 1753.

Waste places, throughout the United States except in the southeast; introduced from Europe.

18A. BROMUS TECTORUM VAR. GLABRATUS Spenner, Fl. Friburg. 1: 152. 1825.

Bromus tectorum var. nudus Klett. and Richt., Fl.

Leipzig 109. 1830.

About the same range as the species, but much less common.

*19. BROMUS RIGIDUS Roth, Mag. Bot. Roem. and Ust. 10: 21. 1790.

Open ground and waste places, Idaho and Washington to Arizona and California, common in southern California, occasional eastward, Maryland, Virginia, and Texas; introduced from Europe.

*20. BROMUS RUBENS L., Cent. Pl. 1: 5. 1755.

Roadsides and waste places; Washington to Arizona and California; introduced from Europe.

21. BROMUS TRINII Desv., in Gay, Fl. Chil. 6: 441. 1853.

Dry plains and rocky or wooded slopes, Oregon to Baja California, rarely eastward to Colorado and Arizona; introduced from Chile.

2. FESTUCA L.

Annuals or perennials with flat or involute blades and narrow or open panicles. Spikelets few to several-flowered, the rachilla disarticulating above the glumes and between the florets; glumes narrow, unequal, the first 1-nerved, the second 3-nerved; lemmas rounded on the back, awnless or awned from the tip; palea not adhering to the caryopsis.

1. Plants annual.

2. Spikelets densely 5- to 13-flowered; awns 1-5 mm. long; lemmas 4-5 mm. long - - - - - - - - - - - - - 1. F. OCTOFLORA.

2. Spikelets mostly less than 5-flowered, or if more, then the awns more than 5 mm. long, usually about 10 mm.

3. First glume 1-2 mm. long; panicles narrow, the branches appressed.

Lemma ciliate toward the apex - - - - - 2. F. MEGALURA.

Lemma not ciliate - - - - - - - - - - - - - 3. F. MYUROS.

3. First glume mostly 4-6 mm. long; panicles open, the branches stiffly spreading.

4. Glumes and lemmas glabrous.

5. Pedicels appressed; spikelets 3- to 5-flowered. 4. F. PACIFICA.

5. Pedicels reflexed; spikelets mostly 1- to 2-flowered - - - - - - - - - - - 5. F. REFLEXA.

4. Glumes glabrous; lemmas densely pubescent. 6. F. ARIDA.

1. Plants perennial.

6. Blades flat, 3-10 mm. wide.

7. Lemmas awned, the awn 5-20 mm. long; panicles open, drooping - - - - - - - - - - - - - - - 7. F. SUBULATA.

7. Lemmas awnless; panicles narrow, erect.

8. Spikelets oblong, the lemmas glabrous; rhizomes wanting; blades lax - - - - - - - - 8. F. ELATIOR.

8. Spikelets ovate, the lemmas scabrous; rhizomes

present; blades firm - - - - - - - - 9. F. KINGII.

6. Blades involute, less than 3 mm. wide.

9. Culms loosely tufted, decumbent at the base, the lower sheaths red, fibrillose; blades soft, glabrous.

10. F. RUBRA.

9. Culms densely tufted; blades hard and firm, usually scabrous.

10. Panicle narrow, the branches appressed; lemmas 4-5 mm. long; blades short - - - - - 11. F. OVINA.

10. Panicle open, the branches ascending or spreading; lemmas about 7 mm. long; blades elongate.

11. Awns 2-4 mm. long - - - - - 12. F. IDAHOENSIS.

11. Awns very short or obsolete.

13. F. ARIZONICA.

*1. FESTUCA OCTOFLORA Walt., Fl. Carol. 81. 1788.

Sterile rocky open ground; southern Canada and throughout the United States, also in Baja California.

*1A. FESTUCA OCTOFLORA VAR. HIRTELLA Piper, Contrib. U. S. Natl. Herb. 10: 12. 1906.

Montana and Washington to Baja California.

2. FESTUCA MEGALURA Nutt., Jour. Acad. Phila. II. 1: 188. 1848.

Open ground at lower or medium altitudes; British Columbia and Idaho south to Arizona and Baja California; Pacific slope of South America.

*3. FESTUCA MYUROS L., Sp. Pl. 74. 1753.

Fields and open ground, Massachusetts to Texas; Washington to Nevada and California; Ohio and Wisconsin; South America; introduced from Europe.

*4. FESTUCA PACIFICA Piper, Contrib. U. S. Natl. Herb. 10: 12. 1906.

Open ground and open woods; British Columbia and Montana, south to New Mexico and Baja California.

5. FESTUCA REFLEXA Buckl., Acad. Nat. Sci. Phila. Proc. 1862: 98. 1862.

Dry or rocky slopes; Washington and Utah, south to Arizona and southern California.

*6. FESTUCA ARIDA Elmer, Bot. Gaz. 36: 52. 1903.

Dry open ground, eastern Washington and Oregon, southwestern Idaho, northeastern California, and western Nevada.

*7. FESTUCA SUBULATA Trin., in Bong., Mem. Acad. St. Petersb. VI. Math. Phys. Nat. 2: 173. 1832.

Moist shady banks and thickets, southeastern Alaska to Wyoming, Utah, and northern California.

*8. FESTUCA ELATIOR L., Sp. Pl. 75. 1753.

Meadows and waste places, introduced in cooler regions of North America; native of Eurasia.

*9. FESTUCA KINGII Cassidy, Colo. Agr. Expt. Sta. Bull. 12: 36. 1890.

Festuca confinis Vasey, Bull. Torrey Bot. Club 11: 126. 1884.

Dry rocky mountain slopes, Oregon to southern California,

east to Montana and Colorado.

*10. FESTUCA RUBRA L., Sp. Pl. 74. 1753.

Moist meadows and marshes; Arctic America, south in the mountains to Georgia, Colorado, Arizona, and California; also in the Old World.

*11. FESTUCA OVINA L., Sp. Pl. 73. 1753.

Festuca saximontana Rydb., Bull. Torrey Bot. Club 36: 536. 1909.

Festuca calligera Rydb., Bull. Torrey Bot. Club 36: 537. 1909.

Open woods and rocky slopes; Alaska to Nebraska, New Mexico, and California, introduced eastward; circumpolar.

11A. FESTUCA OVINA VAR. BRACHYPHYLLA (Schult.) Piper, Contrib. U. S. Natl. Herb. 10: 27. 1906.

Festuca brachyphylla Schult. Mant. 3 (Add. 1): 646. 1827.

Rocky slopes at high altitudes; Arctic regions south in the mountains to California, New Mexico, and Arizona; also in the high mountains of Vermont, New Hampshire, and New York.

12. FESTUCA IDAHOENSIS Elmer, Bot. Gaz. 36: 53. 1903.

Open woods and rocky slopes; British Columbia to Alberta, south to northern New Mexico, Arizona and central California.

13. FESTUCA ARIZONICA Vasey, Contrib. U. S. Natl. Herb. 1: 277. 1893.

Dry plains and open woods; Colorado, Nevada, New Mexico, and Arizona.

3. PUCCINELLIA Parl.

Glabrous annuals or perennials with narrow flat or involute blades and narrow or open panicles. Spikelets several-flowered, the rachilla disarticulating above the glumes and between the florets; glumes firm, obtuse, the first 1-nerved, the second 3-nerved; lemmas firm, rounded on the back, obtuse, scarious toward the tip, glabrous or pubescent at the base, 5-nerved, the nerves parallel, obscure; palea about as long as the lemma or somewhat shorter.

Panicles narrow, compact, the branches short, erect, floriferous nearly to the base - - - - - - - - - - - - - - 1. P. FASCICULATA.

Panicles open, the branches spreading to reflexed, at least some of them naked at the base.

Anthers 1.5-2 mm. long; leaves mostly crowded toward the base, the blades involute; lemmas acute, glabrous - 2. P. LEMMONI.

Anthers 0.7-0.8 mm. long; leaves not crowded toward the base; lemmas obtuse, more or less pubescent at the base.

Panicle branches finally reflexed; lemmas broadly obtuse or truncate, 1.5-2 mm. long - - - - - - - - 3. P. DISTANS.

Panicle branches ascending or spreading; lemmas somewhat narrowed above, 2-3 mm. long - - - - 4. P. NUTTALLIANA.

1. PUCCINELLIA FASCICULATA (Torr.) Bicknell, Bull. Torrey Bot. Club 35: 197. 1908.

Salt marshes along the coast, Nova Scotia to Delaware;

Utah; Nevada (Carson Sink, Churchill Co.).

*2. PUCCINELLIA LEMMONI (Vasey) Scribn., U. S. Dept. Agr., Div. Agrost. Bull. 17: 276. f. 572. 1899.

Moist alkaline soil, southern Idaho and Washington to Nevada and California.

*3. PUCCINELLIA DISTANS (L.) Parl., Fl. Ital. 367. 1848.

Moist, more or less alkaline soil, Quebec to Alaska, south to Maryland, Michigan, Wisconsin, and North Dakota, Washington south to New Mexico and California; introduced from Eurasia.

*4. PUCCINELLIA NUTTALLIANA (Schult.) Hitchc., in Jepson, Fl. Calif. 1: 162. 1912.

Moist, usually alkaline soil, Minnesota to British Columbia, south to Kansas, New Mexico, and California; introduced in Maine and Vermont.

4. GLYCERIA R. Br.

Aquatic perennials with closed sheaths; lemmas broad, strongly nerved, scarious at the apex, glabrous; palea as long as or a little longer than the lemma.

Lemmas 5-nerved.

Panicles open, pyramidal, the branches somewhat flexuous.

1. G. PAUCIFLORA.

Panicles narrow, the branches ascending or appressed.

2. G. ERECTA.

Lemmas 7-nerved.

First glume 0.5-1 mm. long; sheaths scabrous.

First glume 0.5 mm. long; lemmas 2 mm. long; blades mostly 2-4 mm. wide, rarely more than 6 mm., rather firm.

3. G. STRIATA.

First glume 1 mm. long; lemmas 2.5 mm. long; blades 6-12 mm. long, thin, lax - - - - - - - - - - - - - - 4. G. ELATA.

First glume 2 mm. long; sheaths smooth - - - - - 5. G. GRANDIS.

*1. GLYCERIA PAUCIFLORA Presl, Rel. Haenk. 1: 257. 1830.

Panicularia pauciflora Kuntze, Rev. Gen. Pl. 1: 783. 1891.

Shallow water, marshes, and wet meadows, Alaska to South Dakota, south in the mountains to New Mexico and California.

2. GLYCERIA ERECTA Hitchc., in Jepson, Fl. Calif. 1: 161. 1912.

Springy or boggy places, near or above timber line, Crater Lake, Oregon to Mount Whitney, California and Nevada (Glenbrook, Lake Tahoe).

*3. GLYCERIA STRIATA (Lam.) Hitchc., Proc. Biol. Soc., Washington 41: 157. 1928.

Panicularia nervata (Willd.) Kuntze, Rev. Gen. Pl. 2: 783. 1891.

Wet places; Newfoundland to British Columbia, southward to Florida and northern California.

*4. GLYCERIA ELATA (Nash) Hitchc., in Jepson, Fl. Calif. 1: 162. 1912.

Panicularia elata Nash, in Rydb., Mem. N. Y. Bot. Gard. 1:

54. 1900.

Wet meadows and moist woods; Montana to British Columbia, south in the mountains to New Mexico and southern California.

*5. GLYCERIA GRANDIS S. Wats.; A. Gray, Man. ed. 6. 667. 1890.

Panicularia grandis Nash, in Britt. & Brown, Illustr. Fl. ed. 2. 1: 265. 1913.

River banks, marshes, and wet places, Prince Edward Island to Alaska south to Tennessee, Ohio, Nebraska, and Nevada.

5. POA L.

Annual or perennial cespitose or rhizomatous grasses with open or contracted panicles; blades with boat-shaped tips; spikelets ovate or oblong, few to several-flowered; lemmas glabrous or pubescent on the nerves, sometimes pubescent on the internerves, the intermediate nerves usually obscure.

1. Plants annual.
    2. Panicles narrow, rather dense, the branches short, appressed, floriferous to the base. Lemmas pubescent on the nerves, webbed at the base - - - - 1. P. BIGELOVII.
    2. Panicles open, the branches spreading or reflexed, naked at the base.
        3. Lemmas glabrous, webbed at the base; spikelet 2- to 3-flowered; panicle branches finally reflexed. 2. P. BOLANDERI.

3. Lemmas densely pubescent on the nerves, not webbed at the base; panicles small, the branches stiffly ascending or spreading - - - - - - - - - 3. P. ANNUA.

1. Plants perennial.

4. Rhizomes present, strong and usually numerous.

5. Culms conspicuously flattened; panicles narrow, the short branches erect or ascending - 4. P. COMPRESSA.

5. Culms terete or nearly so; panicles open, pyramidal, naked below.

6. Lemmas glabrous or pubescent on the nerves, not webbed at the base; panicle branches mostly in 2's or 3's - - - - - - - - - - - - 5. P. NERVOSA.

6. Lemmas densely pubescent on the nerves, prominently webbed at the base; panicle branches mostly in 5's - - - - - - - - - - - - - - - 6. P. PRATENSIS.

4. Rhizomes wanting (culms decumbent at the base and sometimes appearing rhizomatous in P. palustris and P. glaucifolia).

7. Lemmas webbed at the base, the web sometimes sparse.

8. Panicle branches mostly in 2's, very slender, reflexed or drooping.

9. Spikelets ovate, clustered at the ends of the finally reflexed branches; lemmas about 3 mm. long, acute, densely villous on the nerves, anthers 1 mm. long - 7. P. REFLEXA.

9. Spikelets lanceolate, relatively distant; lemmas 3.5-4 mm. long, acuminate, sparsely pubescent on the nerves, anthers 0.5 mm. long. 8. P. LEPTOCOMA.

8. Panicle branches mostly in 5's, ascending. Culms loosely tufted, usually decumbent at the base, the lower sheaths keeled - - - 9. P. PALUSTRIS.

7. Lemmas not webbed at the base.

10. Lemmas pubescent on the nerves, sometimes also on the internerves.

11. Culms loosely tufted, leafy, erect from a somewhat decumbent base.

Sheaths keeled; ligule 1-2 mm. long; spikelets 2- to 4-flowered, not much longer than the glumes - - - - - - 10. P. GLAUCIFOLIA.

11. Culms densely tufted, erect, the leaves crowded at the base.

12. Blades folded or involute, firm, rather stiff; spikelets large, 5- to 8-flowered, strongly tinged with purple.

13. Ligule very short, not noticeable when viewed from the side of the sheath. 11. P. FENDLERIANA.

13. Ligule 5-7 mm. long, easily seen in side view - - - 12. P. LONGILIGULA.

12. Blades flat, or, if involute, rather soft

and lax. Plants of high altitudes.

13. P. RUPICOLA.

10. Lemmas glabrous or evenly pubescent across the back, the pubescence sometimes sparse.

14. Spikelets flattened, the glumes and lemmas keeled. Lemmas glabrous.

15. Blades scabrous, often elongate, filiform.

14. P. CUSICKII.

15. Blades glabrous, relatively short in a dense basal cluster.

16. Blades of the culm 2-3 mm. wide, flat, those of the innovations slender or filiform - - - - - - 15. P. EPILIS.

16. Blades all alike. Lemmas 5-6 mm. long; panicle usually pale or silvery.

16. P. PRINGLEI.

14. Spikelets subterete, the lemmas rounded on the back or obscurely keeled toward the tip.

17. Lemmas crisp-pubescent across the back at the base.

18. Culms loosely tufted, somewhat decumbent at the base; panicle branches stiffly spreading.

17. P. GRACILLIMA.

18. Culms densely tufted, erect; panicle branches ascending or appressed.

19. Culms slender, usually less than 30 cm. tall, with numerous short innovations at the base. 18. P. SECUNDA.

19. Culms stouter, usually more than 50 cm. tall; innovations usually not numerous - - 19. P. CANBYI.

17. Lemmas glabrous.

20. Ligule long, decurrent; sheaths scaberulous - - - - 20. P. NEVADENSIS.

20. Ligule short.

21. Blades involute; culms relatively slender, 50-100 cm. tall. 21. P. JUNCIFOLIA.

21. Blades flat; culms coarse, 80-100 cm. tall - - - - 22. P. AMPLA.

1. POA BIGELOVII Vasey and Scribn.; Vasey, Descr. Cat. Grasses U. S. 81. 1885.

Open ground; Oklahoma and western Texas to Nevada and southern California; northern Mexico.

*2. POA BOLANDERI Vasey, Bot. Gaz. 7: 32. 1882.

Dry wooded slopes and open ground at medium altitudes, Washington and Idaho to western Nevada and the southern Sierras in California.

*3. POA ANNUA L., Sp. Pl. 68. 1753.

Open ground, lawns and waste places; Newfoundland to Alaska, south to Florida and California; also in tropical America at higher altitudes; introduced from Europe.

*4. POA COMPRESSA L., Sp. Pl. 69. 1753.

Open ground, meadows and waste places; Newfoundland to Alaska, south to Georgia, Tennessee, Alabama, Oklahoma, New Mexico, and California; introduced from Europe.

*5. POA NERVOSA (Hook.) Vasey, U. S. Dept. Agr., Div. Bot. Bull. 13(2); pl. 81. 1893.

Poa wheeleri Vasey, in Wheeler, Cat. Pl. Survey W. 100th Merid. 55. 1874.

Dry ground and open woods at medium altitudes, Alberta and British Columbia, south in the mountains to Colorado, New Mexico, and California.

*6. POA PRATENSIS L., Sp. Pl. 67. 1753.

Moist meadows, open woods, and open ground; Canada and throughout the United States, except in dry or hot situations; introduced from Europe.

*7. POA REFLEXA Vasey and Scribn., Contrib. U. S. Natl. Herb. 1: 276. 1893.

Moist open meadows and stream banks; Montana to eastern British Columbia, south to New Mexico and Arizona.

*8. POA LEPTOCOMA Trin., Mem. Acad. St. Petersb. VI. Math. Phys. Nat. 1: 374. 1830.

Bogs, moist ground, and along streams; Alaska south in the

mountains to northern New Mexico, Utah, Nevada, and California.

*9. POA PALUSTRIS L., Syst. Nat. ed. 10. 2: 874. 1759.

Meadows and moist open ground; Newfoundland and Quebec to Alaska, south to Virginia, Missouri, New Mexico, and California; Eurasia.

10. POA GLAUCIFOLIA Scribn. and Williams, U. S. Dept. Agr., Div. Agrost. Circ. 10: 6. 1899.

Moist places; Wisconsin to Montana south to New Mexico, Arizona, and Nevada (Summit Lake).

11. POA FENDLERIANA (Steud.) Vasey, U. S. Dept. Agr., Div. Bot. Bull. 13(2): pl. 74. 1893.

Rocky slopes and open woods; South Dakota to Idaho, south to western Texas and southern California. Usually P. fendleriana is a tufted grass but it sometimes produces rhizomes. Typically the lemmas are pubescent on the keel and nerves, but frequently forms occur with the lemmas nearly or entirely glabrous.

*12. POA LONGILIGULA Scribn. & Williams, U. S. Dept. Agr., Div. Agrost. Circ. 9: 3. 1899.

Rocky slopes and open woods; North Dakota to Oregon, south to New Mexico and California.

13. POA RUPICOLA Nash, Mem. N. Y. Bot. Gard. 1: 49. 1900.

Alpine meadows and rocky slopes above timber line; Montana to Oregon, south to Arizona and California.

14. POA CUSICKII Vasey, Contrib. U. S. Natl. Herb. 1: 271. 1893.

Dry or rocky slopes at medium and high altitudes.

15. POA EPILIS Scribn., U. S. Dept. Agr., Div. Agrost. Circ. 9: 5. 1899.

Mountain meadows, mostly above timber line, Alberta to British Columbia, south to Colorado, Utah, Nevada, and California.

*16. POA PRINGLEI Scribn., Bull. Torrey Bot. Club 10: 31. 1883.

Rocky alpine slopes, Montana to Washington, south to Nevada (Mount Rose) and California.

17. POA GRACILLIMA Vasey, Contrib. U. S. Natl. Herb. 1: 272. 1893.

Cliffs and rocky slopes, Alberta to Alaska, south to Wyoming, northern Nevada and the southern Sierras of California.

*18. POA SECUNDA Presl, Rel. Haenk. 1: 271. 1830.

Poa sandbergii Vasey, Contrib. U. S. Natl. Herb. 1: 276. 1893.

Plains and rocky slopes at medium and upper altitudes, North Dakota to Yukon Territory, south to New Mexico, Utah, Nevada, and southern California; Chile.

*19. POA CANBYI (Scribn.) Piper, Contrib. U. S. Natl. Herb, 11: 132. 1906.

Dry or sandy ground, Michigan to Yukon Territory, south to western Nebraska, Colorado, and eastern Washington and Oregon.

*20. POA NEVADENSIS Vasey; Scribn., Bull. Torrey Bot. Club 10: 66. 1883.

Dry hills, moist meadows, and along streams, Montana to Yukon Territory and Washington, south to Colorado, Arizona,

and California.

*21. POA JUNCIFOLIA Scribn., U. S. Dept. Agr., Div. Agrost. Bull. 11: 52. pl. 8. 1898.

Poa brachyglossa Piper, Biol. Soc. Wash. Proc. 18: 145. 1905.

Dry sandy ground, rocky slopes, and alkaline meadows; Montana to British Columbia, south to Colorado and northeastern California.

*22. POA AMPLA Merr., Rhodora 4: 145. 1902.

Poa confusa Rydb., Bull. Torrey Bot. Club 32: 607. 1905.

Moist meadows or dry or rocky slopes, Montana to Yukon Territory, south to New Mexico, Arizona, and California.

6. ERAGROSTIS Beauv.

Annuals with open panicles; florets closely imbricate, the rachilla disarticulating above the glumes and between the florets or continuous, the lemmas deciduous, the paleas persistent; lemmas 3-nerved, the nerves sometimes obscure; palea about as long as the lemma.

Plants with minute glandular depressions on the branches, or the keels of the lemmas.

Spikelets 2.5-3 mm. wide, the keels of the lemmas with a few prominent glandular depressions; panicles open, dark gray-green or tawny - - - - - - - - - - - - - - 1. E. CILIANENSIS.

Spikelets 1-1.5 mm. wide, the keels of the lemmas without

glands; panicles narrow, the branches ascending or appressed, yellowish-green - - - - - - - - - - - - - - 2. E. LUTESCENS.

Plants not glandular, or with a few scattered glands on the sheaths.

Spikelets about 1 mm. wide, linear, slender - 3. E. ORCUTTIANA.

Spikelets 1.5 mm. wide or wider, ovate to linear.

4. E. DIFFUSA.

*1. ERAGROSTIS CILIANENSIS (All.) Link; Vign. Lut., Malpighia 18: 386. 1904.

A common weed in cultivated ground and waste places; throughout the United States except at higher altitudes; Mexico to Argentina; introduced from Europe.

*2. ERAGROSTIS LUTESCENS Scribn., U. S. Dept. Agr., Div. Agrost. Circ. 9: 7. 1899.

Dry ground and sandy shores; Idaho and Washington to Arizona and California, rare.

*3. ERAGROSTIS ORCUTTIANA Vasey, Contrib. U. S. Natl. Herb. 1: 269. 1893.

Fields and waste places; Oregon to Arizona and California; Colorado.

4. ERAGROSTIS DIFFUSA Buckl., Acad. Nat. Phila. Proc. 1862: 97. 1862.

Open ground and waste places; Texas to Nevada and southern California; introduced eastward in a few localities; northern Mexico. (E. caroliniana Scribn., in Tidestrom, Flora of Utah

and Nevada).

7. CATABROSA Beauv.

Aquatic perennials; spikelets brown, 2-flowered, the florets distant; glumes nerveless, irregularly toothed; lemmas broad, 3-nerved, the apex scarious; palea as long as the lemma.

1. CATABROSA AQUATICA (L.) Beauv., Ess. Agrost. 97, 149, 157. pl. 19. f. 8. 1812.

Mountain meadows, around springs and along streams; Newfoundland to Alberta; North Dakota to Oregon, south to Colorado and Arizona; Eurasia.

8. DISTICHLIS Raf.

Dioecious perennials with creeping, scaly rhizomes, rigid culms, and dense, few-flowered panicles; glumes broad, acute, keeled, 3- to 7-nerved; lemmas closely imbricate, coriaceous; palea usually a little shorter than the lemma.

Keels of the palea broad, finally dentate; panicles congested, usually overtopped by the leaves - - - - - - - - - 1. D. DENTATA.

Keels of the palea narrow, entire; panicle relatively loose, usually exceeding the blades - - - - - - - - - - - - - 2. D. STRICTA.

*1. DISTICHLIS DENTATA Rydb., Bull. Torrey Bot. Club 36: 536. 1909.

Alkaline soil; Idaho and Washington to Colorado, Arizona and California.

*2. DISTICHLIS STRICTA (Torr.) Rydb., Bull. Torrey Bot. Club 32: 602. 1905.

Alkaline soil; Saskatchewan to eastern Washington, south to Texas and California; Mexico.

These two species were referred to D. spicata (L.) Greene in Tidestrom, Flora of Utah and Nevada.

9. DACTYLIS L.

Densely tufted perennial with flat blades and open panicles, the spikelets subsessile in dense clusters at the ends of the branches; spikelets compressed, few-flowered; glumes unequal, acute, hispid-ciliate on the keel; lemmas keeled, mucronate, ciliate on the keel.

*1. DACTYLIS GLOMERATA L., Sp. Pl. 71. 1753.

Fields, meadows, and waste places, Newfoundland to Alaska, south to Florida, Arizona, and California; Eurasia; often escaped from cultivation.

10. PHRAGMITES Trin.

Coarse perennial with broad, flat, linear blades and usually

large panicles; glumes unequal, the first about half as long as the second; rachilla hairy; lemmas long-acuminate, glabrous, the summits of all about equal; palea much shorter than the lemma.

*1. PHRAGMITES COMMUNIS (L.) Trin., Fund. Agrost. 134. 1820.

Marshes and wet ground along irrigation canals and river banks; distributed throughout the world.

11. MELICA L.

Perennials with closed sheaths and usually rather narrow panicles of large spikelets; glumes thin, acute or obtuse, nearly as long as the lower floret; lemmas firm with scarious margins, awnless; palea much shorter than the lemma.

Culms bulbous at the base; pedicels of spikelets stout, or, if slender or capillary the spikelets not falling entire.

Bulbs subglobose; panicles open or if narrow then lax and loosely flowered.

Panicles lax, loosely flowered. Pedicels slender, flexuous - - - - - - - - - - - - - - - - - - 1. M. SPECTABILIS.

Panicles stiff with short, abruptly spreading branches.

Rachilla soft, usually brownish - - - - - 2. M. FUGAX.

Bulbs narrowly ovate; panicles narrow, rather densely flowered, the branches stiffly ascending or appressed.

3. M. BULBOSA.

Culms not bulbous at the base; pedicels of spikelets capillary,

pubescent, the spikelets reflexed, falling entire.

4. M. STRICTA.

*1. MELICA SPECTABILIS Scribn., Acad. Nat. Sci. Phila. Proc. 1885: 45. pl. 1. f. 11, 12, 13. 1885.

Rocky or open woods, Montana to British Columbia, south to Colorado and northern California.

*2. MELICA FUGAX Boland., Proc. Calif. Acad. 4: 104. 1870.

Dry hills and open woods, Washington to Nevada and central California.

*3. MELICA BULBOSA Geyer; Port. and Coult., Syn. Fl. Colo. 149. 1874.

Melica bella Piper, U. S. Dept. Agr., Div. Agrost. Circ. 27: 10. 1900.

Melica bella var. intonsa Piper, Contrib. U. S. Natl. Herb. 11: 128. 1906.

Open meadows and wooded hills, Montana to British Columbia, south to Colorado and California; western Texas.

*4. MELICA STRICTA Boland., Calif. Acad. Sci. Proc. 3: 4. 1863.

Dry rocky slopes, Utah to Oregon (Steins Mountain) and the Sierras and mountains of southern California.

12. TRIODIA R. Br.

Cespitose or stoloniferous perennials with open or contracted panicles; glumes nearly equal; lemmas rounded on the back, the apex

toothed or lobed, the midnerve usually excurrent in a short awn, the lateral nerves often excurrent as minute points, all the nerves pubescent.

Plants widely stoloniferous; panicle small, capitate, usually exceeded by fascicles of leaves - - - - - - - - - 1. T. PULCHELLA.

Plants cespitose, without stolons; panicles narrow or dense, much exceeding the leaves.

Panicles ovoid, 1-2 cm. long; lemmas acute, the awn 1-2 mm. long - 2. T. PILOSA.

Panicles elongate, 10-25 cm. long; lemmas obtuse, entire or minutely notched, awnless - - - - - - - - - - - 3. T. MUTICA.

1. TRIODIA PULCHELLA H.B.K., Nov. Gen. and Sp. 1: 155. pl. 47. 1816.

Mesas and rocky hills; Utah and Nevada, western Texas to southern California.

*2. TRIODIA PILOSA (Buckl.) Merr., U. S. Dept. Agr., Div. Agrost. Circ. 32: 9. 1901.

Plains and rocky hills; Kansas to Nevada, south to central Mexico.

3. TRIODIA MUTICA (Torr.) Scribn., Bull. Torrey Bot. Club 10: 30. 1883.

Dry plains and rocky hills; Texas and Colorado to Nevada and southeastern California.

13. BLEPHARIDACHNE Hack.

Low, densely tufted perennial with short, stiff, involute blades and small capitate panicles scarcely exceeding the subtending leaves. Spikelets 4-flowered, the rachilla articulated above the glumes but not between the florets; the first two florets sterile, the third fertile, the fourth reduced to a 3-awned rudiment; glumes equal, thin, 1-nerved; lemmas 3-nerved, deeply cleft, the awned lobes conspicuously ciliate.

1. BLEPHARIDACHNE KINGII (S. Wats.) Hack., in DC., Monogr. Phan. 6: 261. 1889.

   Deserts, Utah (Millard Co.), Nevada, and California (Death Valley).

   Closely resembles Triodia pulchella and possibly sometimes mistaken for it; apparently rare.

14. SCLEROPOGON Phil.

Monoecious or dioecious, stoloniferous perennial with short flexuous blades and narrow panicles; staminate spikelets several-flowered, the lemmas similar to the glumes, mucronate, the palea obtuse, shorter than the lemma; pistillate spikelets several-flowered, the florets falling together, the lowest one with a sharp-bearded callus, the upper ones reduced to awns, the nerves of the lemmas extending into slender, spreading awns.

1. SCLEROPOGON BREVIFOLIUS Phil., An. Univ. Chile 36: 206. 1870.

Mesas, open slopes and valleys, Texas, Colorado, and Arizona to central Mexico.

15. AGROPYRON Gaertn.

Perennials, often with creeping rhizomes, with erect or sometimes decumbent culms and usually erect green spikes; glumes equal, firm, acute or awned, usually shorter than the first lemma; lemmas firm, rounded on the back, acute or awned, the awn straight or divergent.

1. Rhizomes present, well developed.
    2. Blades flat, relatively thin and rather lax; glumes strongly nerved - - - - - - - - - - - - - - - - - - - 1. A. REPENS.
    2. Blades involute, or, if flat, firm and strongly nerved; glumes faintly nerved.
        3. Glumes asymmetrical, gradually tapering into a short awn; culms sod-forming, not in clumps. 2. A. SMITHII.
        3. Glumes symmetrical, abruptly acute or awn-pointed; culms in small clumps.
            4. Lemmas glabrous - - - - - - - - - - - 3. A. RIPARIUM.
            4. Lemmas pubescent - - - - - - - - - 4. A. DASYSTACHYUM.
1. Rhizomes wanting.
    5. Lemmas awnless.

6. Spikelets distant, usually shorter than the internodes of the rachis; blades narrow, involute.

6. A. INERME.

6. Spikelets crowded; blades flat - - - 5. A. PAUCIFLORUM.

5. Lemmas awned.

7. Awn straight - - - - - - - - - - - - - 7. A. SUBSECUNDUM.

7. Awn divergent.

8. Culms decumbent spreading, 20-40 cm. long.

8. A. SCRIBNERI.

8. Culms erect.

9. Spikelets distant; rachis continuous.

10. Awns spreading at right angles; glumes acute, awnless - - - - 9. A. SPICATUM.

10. Awns divergent when dry, but not at right angles; glumes short, awned.

10. A. ARIZONICUM.

9. Spikelets imbricate; rachis tardily disarticulating - - - - - - - - - - - 11. A. SAXICOLA.

*1. AGROPYRON REPENS (L.) Beauv., Ess. Agrost. 102, 146, 180. pl. 20, f. 2. 1812.

A weed in waste and cultivated ground.

2. AGROPYRON SMITHII Rydb., Mem. N. Y. Bot. Gard. 1: 64. 1900. (Feb.)

Dry hills, moist open ground; Alberta; New York to Washington, south to Kentucky, Texas, and California.

2A. AGROPYRON SMITHII VAR. MOLLE (Scribn. and Smith) Jones, Contrib. West. Bot. 14: 18. 1912.

Glumes and lemmas pubescent. About the same range as the species.

3. AGROPYRON RIPARIUM Scribn. and Smith, U. S. Dept. Agr., Div. Agrost. Bull. 4: 35. 1897.

Dry or moist meadows and hills; North Dakota to Alberta and Washington, south to Colorado, northern Arizona and Nevada.

4. AGROPYRON DASYSTACHYUM (Hook.) Scribn., Bull. Torrey Bot. Club 10: 78. 1883.

Plains and sandy shores, Michigan to British Columbia, south to Illinois, Nebraska, Colorado, Arizona, and Nevada.

*5. AGROPYRON PAUCIFLORUM (Schwein.) Hitchc., Amer. Jour. Bot. 21: 132. 1934.

Agropyron tenerum Vasey, Bot. Gaz. 10: 258. 1885.

Moist meadows and open woods; Labrador to Alaska, south to West Virginia, Kansas, Arizona, and California.

6. AGROPYRON INERME (Scribn. and Smith) Rydb., Bull. Torrey Bot. Club 36: 539. 1909.

Dry plains and rocky hills, Montana to British Columbia, south to western Nebraska, Utah, and Nevada.

*7. AGROPYRON SUBSECUNDUM (Link) Hitchc., Amer. Jour. Bot. 21: 131. 1934.

Moist meadows and open woods; Newfoundland to Alaska, south to West Virginia, Missouri, Arizona, and California. (As A. canium (L.) Beauv. in Tidestron, Flora of Utah and Nevada)

7A. AGROPYRON SUBSECUNDUM VAR. ANDINUM (Scribn. & Smith) Hitchc., Amer. Jour. Bot. 21: 132. 1934.

Alpine meadows, Montana to Washington, south to Colorado and Nevada.

8. AGROPYRON SCRIBNERI Vasey, Bull. Torrey Bot. Club 10: 128. 1893.

Alpine slopes; Montana and Idaho to New Mexico and Arizona.

9. AGROPYRON SPICATUM (Pursh) Scribn. and Smith, U. S. Dept. Agr., Div. Agrost. Bull. 4: 33. 1897.

Rocky mountain slopes, plains and dry open woods; Michigan and North Dakota to Alaska, south to New Mexico and California.

10. AGROPYRON ARIZONICUM Scribn. and Smith, U. S. Dept. Agr., Div. Agrost. Bull. 4: 27. 1897.

Rocky slopes; western Texas to Nevada and California; Chihuahua.

11. AGROPYRON SAXICOLA (Scribn. and Smith) Piper, Contrib. U. S. Natl. Herb, 11: 148. 1906.

Dry or rocky slopes and plains, Washington, south to Utah, Arizona, and California.

16. ELYMUS L.

Cespitose or rhizomatous perennials with usually broad, flat blades and slender or sometimes dense spikes; spikelets 2- to 6-

flowered, more or less dorsiventral to the axis; glumes equal, firm or indurate, somewhat asymmetrical; lemmas rounded on the back, awnless or awned from the tip.

Plants with slender creeping rhizomes. Spikelets often solitary, rather irregularly placed on the axis.

1. E. TRITICOIDES.

Plants without creeping rhizomes (or short and stout in E. condensatus).

Glumes narrow or subulate, obscurely nerved, not broadened above the base.

Spikelets awnless; rachis continuous.

Spikes large, thick, often compound; spikelets 2 to 4 at each node; culms usually tall and stout.

2. E. CONDENSATUS.

Spikes narrow, slender, loosely flowered, most of the spikelets solitary; culms relatively slender.

3. E. SALINA.

Spikelets awned; rachis tardily disjointing.

Spike mostly 5-7 mm. wide; spikelets mostly in 2's; blades subinvolute - - - - - - - - - - 4. E. MACOUNII.

Spike 8-10 mm. wide; spikelets often in 3's; blades flat, 5-10 mm. wide - - - - - - - - - 5. E. ARISTATUS.

Glumes broadened above the base, rather prominently nerved; spikelets awned; rachis continuous - - - - - 6. E. GLAUCUS.

*1. ELYMUS TRITICOIDES Buckl., Acad. Nat. Sci. Phila. Proc. 1862: 99. 1862.

Rocky hills, canyons and open woods; Montana and Washington to Texas and California; Baja California.

1A. ELYMUS TRITICOIDES VAR. PUBESCENS Hitchc., in Jepson, Fl. Calif. 1: 186. 1912.

Sheaths and blades pubescent.

Idaho, Oregon, Nevada, and California.

*1B. ELYMUS TRITICOIDES VAR. SIMPLEX (Scribn. & Will.) Hitchc., Amer. Jour. Bot. 21: 132. 1934.

Spikelets mostly solitary.

Wyoming and Colorado to California (Tahoe) and eastern Oregon.

*2. ELYMUS CONDENSATUS Presl, Rel. Haenk. 1: 265. 1830.

Dry plains and slopes; Minnesota to Washington, south to Arizona and California.

2A. ELYMUS CONDENSATUS VAR. PUBENS Piper, Erythea 7: 101. 1899.

Elymus cinereus Scribn. and Merr., Bull. Torrey Bot. Club 29: 467. 1902.

Sheaths and blades harsh-puberulent.

Washington, Nevada, and California.

3. ELYMUS SALINA Jones, Calif. Acad. Sci. Proc. II. 5: 725. 1895.

Dry hills; Wyoming, Idaho, Utah, Nevada, and Arizona.

*4. ELYMUS MACOUNII Vasey, Bull. Torrey Bot. Club 13: 119. 1886.

Wet meadows and open ground, Minnesota to Alaska and

eastern Washington, south to Iowa, Nebraska, New Mexico, and California.

5. ELYMUS ARISTATUS Merr., Rhodora 4: 147. 1902.

Meadows and open slopes at medium altitudes, Idaho and Washington, south to Nevada and California.

*6. ELYMUS GLAUCUS Buckl., Acad. Nat. Sci. Phila. Proc. 1862: 99. 1862.

Open woods, thickets and along streams; Ontario and Michigan to Alaska, south through Montana to Arizona and California.

*6A. ELYMUS GLAUCUS VAR. JEPSONI Davy, in Jepson, Fl. West. Mid. Calif. 79. 1901.

Sheaths pubescent.

British Columbia to California; Montana.

17. SITANION Raf.

Tufted perennials with firm, narrow blades and rather dense bushy spikes. Spikes 2- to few-flowered; glumes firm, very narrow, extending into one to several long, scabrous, ascending or divergent awns, sometimes with a short bristle from the margin; lemmas firm, rounded on the back, minutely bifid, the midnerve extended into a long divergent awn.

Spike much longer than broad; glumes narrowly lanceolate, 2- to 4-nerved - 1. S. HANSENI.

Spike as broad as long or broader; glumes bristle-like, 1- or obscurely 2-nerved.

Glumes cleft into at least 3 fine divisions - - 2. S. JUBATUM.

Glumes entire or 2-cleft - - - - - - - - - - - - - 3. S. HYSTRIX.

*1. SITANION HANSENI (Scribn.) J. G. Smith, U. S. Dept. Agr., Div. Agrost. Bull. 18: 20. 1899.

Sandy flats, rocky slopes, and open woods, Idaho to eastern Washington, Utah to California.

*2. SITANION JUBATUM J. G. Smith, U. S. Dept. Agr., Div. Agrost. Bull. 18: 10. 1899.

Sitanion breviaristatum J. G. Smith, U. S. Dept. Agr., Div. Agrost. Bull. 12. 1899.

Dry rocky hills and plains and open woods; Idaho to eastern Washington, south to Utah, Nevada and Baja California.

*3. SITANION HYSTRIX (Nutt.) J. G. Smith, U. S. Dept. Agr., Div. Agrost. Bull. 18: 15. pl. 2. 1899.

Sitanion cinereum J. G. Smith, U. S. Dept. Agr., Div. Agrost. Bull. 18: 14. 1899.

Sitanion insulare J. G. Smith, U. S. Dept. Agr., Div. Agrost. Bull. 18: 14. 1899.

Open sandy ground, rocky hills and open woods; South Dakota to British Columbia, south to Missouri, Texas, and Mexico.

18. HORDEUM L.

Annuals or perennials with flat blades and dense bristly spikes; spikelets 1-flowered, 3 at each node of the articulate rachis, the middle one sessile, the lateral ones pedicelled, usually imperfect, sometimes reduced to bristles; glumes narrow or subulate; lemmas with the back turned toward the rachis, rounded, obscurely nerved, tapering into an awn.

Plants perennial.

Awns 2-5 cm. long; spikes nodding - - - - - - - - 1. H. JUBATUM.

Awns mostly less than 1 cm. long; spikes erect.

2. H. NODOSUM.

Plants annual.

Glumes ciliate except the outer ones of the lateral spikelets.

3. H. MURINUM.

Glumes not ciliate - - - - - - - - - - - - - - - 4. H. GUSSONIANUM.

*1. HORDEUM JUBATUM L., Sp. Pl. 85. 1753.

A common weed in moist open ground, along ditches, waste places; Newfoundland to Alaska, south to Maryland, Missouri, Texas, and California.

*2. HORDEUM NODOSUM L., Sp. Pl. ed. 2. 1: 126. 1762.

Meadows and open ground; Alaska to Montana, New Mexico, and California; introduced in a few localities in the eastern states.

*3. HORDEUM MURINUM L., Sp. Pl. 85. 1753.

A weed in cultivated ground and waste places; Maine to Georgia and Alabama, British Columbia to western Texas and California; introduced from Europe.

*4. HORDEUM GUSSONIANUM Parl., Fl. Palerm. 1: 246. 1845.

A weed along ditches; British Columbia to Utah, Arizona, and California.

19. LOLIUM L.

Perennials with flat blades and usually long, slender spikes; spikelets several-flowered, placed edgewise to the rachis, the first glume wanting; lemmas rounded on the back, obtuse, acute, or awned.

Lemmas awnless - 1. L. PERENNE.
Lemmas, or at least some of them, awned - - - - 2. L. MULTIFLORUM.

*1. LOLIUM PERENNE L., Sp. Pl. 83. 1753.

Meadows and waste places; Newfoundland to Alaska, south to Virginia and California; introduced from Europe.

*2. LOLIUM MULTIFLORUM Lam., Fl. Franc. 3: 621. 1778.

Open ground and waste places, about same range as L. perenne; introduced from Europe.

20. SCHISMUS Beauv.

Low annual with short, slender blades and small rather dense panicles; spikelets several-flowered; glumes acute, subequal, nearly as long as the spikelets; lemmas broad, rounded on the back, bidentate, pilose on the lower part of the margins; palea broad, hyaline, the nerves near the margins.

1. SCHISMUS BARBATUS (L.) Thell., Bull. Herb. Boiss. II. 7: 391. 1907.

   Deserts, roadsides, and rocky slopes, Colorado, Nevada (Newberry Mountains), Arizona, and California introduced; southern Europe to India and South Africa.

21. KOELERIA Pers.

Tufted perennial with narrow blades and shining spikelike panicles; spikelets 2- to 4-flowered, the rachilla prolonged beyond the florets as a slender bristle; glumes dissimilar, the first narrow, 1-nerved, the second broadened above the middle, 3- to 5-nerved; lemma pale, shining, acute, awnless.

1. KOELERIA CRISTATA (L.) Pers., Syn. Pl. 1: 97. 1805.

   Dry plains, rocky ground, and pine woods; Ontario to British Columbia, south to Delaware, Missouri, Louisiana, California, and Mexico.

22. SPHENOPHOLIS Scribn.

Slender perennials with flat blades and narrow often dense shining panicles; spikelets 2- to 3-flowered, the pedicel disarticulating below the glumes, the rachilla produced beyond the upper floret; first glume narrow, acute, the second broadly obovate; lemmas firm, awnless, the first usually a little longer than the second glume.

Panicle dense, often spikelike, erect; second glume very broad, obtuse - 1. S. OBTUSATA.

Panicle rather loose, nodding, never spikelike; second glume subacute - 2. S. INTERMEDIA.

*1. SPHENOPHOLIS OBTUSATA (Michx.) Scribn., Rhodora 8: 144. 1906.

Moist ground and open woods; Maine to British Columbia, south to Florida and California; Mexico and the Dominican Republic.

2. SPHENOPHOLIS INTERMEDIA (Rydb.) Rydb., Bull. Torrey Bot. Club 36: 533. 1909.

Moist ground and shady places; Newfoundland to British Columbia, south to Florida and Arizona. (As S. pallens (Spreng.) Scribn., in Tidestrom, Flora of Utah and Nevada).

23. TRISETUM Pers.

Tufted perennials with flat blades or open or spikelike, usually shining panicles; spikelets 2- to 3-flowered, the rachilla prolonged beyond the upper floret, usually villous; glumes acute, the second a little longer than the first; lemma 2-toothed, bearing from just below the cleft a bent exserted awn (or nearly awnless in T. wolfii).

Lemmas awnless or with a minute, included awn - - - - 1. T. WOLFII.
Lemmas awned, the awns long, exserted.
Panicle dense, spikelike; spikelets 5-6 mm. long, 3- to 5-flowered - - - - - - - - - - - - - - - - - - 2. T. SPICATUM.
Panicles open, or sometimes rather dense but not spikelike; spikelets 2-flowered, about 8 mm. long - - 3. T. CANESCENS.

*1. TRISETUM WOLFII Vasey, U. S. Dept. Agr. Monthly Rept. Feb. Mar. 156. 1874.

Mountain meadows and moist open ground, Montana to Washington, south to New Mexico and California.

*2. TRISETUM SPICATUM (L.) Richt., Pl. Eur. 1: 59. 1890.

Mountain meadows at relatively high altitudes; Arctic America, south to Connecticut, Pennsylvania, and Minnesota; and in the mountains to New Mexico and California; high mountains of Mexico and South America, and alpine regions of the Old World.

*3. TRISETUM CANESCENS Buckl., Acad. Nat. Sci. Phila. Proc. 1862: 100. 1862.

Mountain meadows and along streams, sometimes in deep shade, Montana to British Columbia, south to Nevada and central California.

24. DESCHAMPSIA Beauv.

Annuals or perennials with narrow or open, shining panicles; spikelets 2-flowered, the hairy rachilla prolonged beyond the upper floret, sometimes bearing a rudimentary floret; glumes equal, acute; lemmas thin, erose-truncate with a straight or bent and twisted awn from or below the middle.

Plants annual; panicle open, the stiffly ascending capillary branches usually in 2's - - - - - - - - - - 1. D. DANTHONIOIDES.

Plants perennial; panicle narrow or open, the slender branches appressed or drooping.

Glumes usually longer than the florets; panicles usually narrow, as much as 30 cm. long, the branches appressed; blades filiform, lax - - - - - - - - - - - - - - - - 2. D. ELONGATA.

Glumes shorter than the florets; panicle open, nodding, 10-25 cm. long, the branches drooping; blades firm, flat or folded - - - - - - - - - - - - - - - - - - - 3. D. CAESPITOSA.

*1. DESCHAMPSIA DANTHONIOIDES (Trin.) Munro; Benth., Pl. Hartw. 342. 1857.

Dry or moist open ground; Alaska to Montana and Baja California; Texas; Chile.

*2. DESCHAMPSIA ELONGATA (Hook.) Munro; Benth., Pl. Hartw. 342. 1857.

Moist or dry open ground; Alaska to Wyoming, Arizona, and California; Mexico.

*3. DESCHAMPSIA CAESPITOSA (L.) Beauv., Ess. Agrost. 91, 149, 160. pl. 18. f. 3. 1812.

Damp or wet mountain meadows; Greenland to Alaska, south to North Carolina, Illinois, North Dakota, New Mexico, and California; also in the Old World.

25. AVENA L.

Annuals with relatively broad blades and open panicles of large spikelets; spikelets 2- to 3-flowered, the rachilla villous; glumes equal, several-nerved, exceeding the florets; lemmas indurate, bidentate, hairy, bearing a dorsal bent or twisted awn.

Teeth of lemma setaceous; pedicels curved, capillary. 1. A. BARBATA.

Teeth of lemma acute; pedicels rather stout - - - - - 2. A. FATUA.

*1. AVENA BARBATA Brot., Fl. Lusit. 1: 108. 1804.

A weed in waste places, Washington to Arizona and California.

*2. AVENA FATUA L., Sp. Pl. 80. 1753.

Waste places; Maine to Washington, south to Pennsylvania, Missouri, South Dakota, New Mexico, and California.

26. HOLCUS L.

Tufted perennial with flat velvety blades and compact panicles; spikelets 2-flowered, the pedicel disarticulating below the glumes; glumes nearly equal, longer than the florets; first floret perfect, the lemma awnless; second floret staminate, bearing a short recurved awn from the back near the summit.

*1. HOLCUS LANATUS L., Sp. Pl. 1048. 1753.

Notholcus lanatus Nash; Hitchc., in Jepson, Fl. Calif. 1: 126. 1912.

Meadows and moist places; Maine to Iowa, south to Georgia and Louisiana; British Columbia to Arizona and California; introduced from Europe.

27. DANTHONIA Lam. and DC.

Tufted perennial with small open panicles of rather large spikelets; spikelets several-flowered; glumes equal, broad, papery,

exceeding the florets; lemma rounded on the back, bifid, the lobes acute, with a stout, flat, twisted, geniculate awn from between the lobes.

Panicle narrow, the pedicels appressed - - - - - 1. D. INTERMEDIA.
Panicle open, the slender pedicels spreading or reflexed.
2. D. CALIFORNICA.

1. DANTHONIA INTERMEDIA Vasey, Bull. Torrey Bot. Club 10: 52. 1883.

Wet meadows in northern or alpine regions; Quebec to Alaska, south to Michigan, New Mexico, and California.

2. DANTHONIA CALIFORNICA Boland., Calif. Acad. Sci. Proc. 2: 182. 1863.

Meadows and open woods, Montana to British Columbia, south to Colorado and California.

28. CALAMAGROSTIS Adans.

Erect, rhizomatous perennials with firm, flat or loosely involute blades and spikelike or narrow open panicles; glumes equal, acute or acuminate; rachilla prolonged beyond the floret, hairy; lemma shorter than the glumes, the callus bearded, the midnerve exserted as an awn.

Awn longer than the glumes, geniculate - - - - 1. C. PURPURASCENS.

Awn included or scarcely longer than the glumes, straight or geniculate.

Sheaths pubescent on the collar - - - - - - - - 2. C. RUBESCENS.

Sheaths glabrous on the collar.

Panicle nodding, rather loose and open - 3. C. CANADENSIS.

Panicle erect, dense or spikelike - - - - 4. C. INEXPANSA.

1. CALAMAGROSTIS PURPURASCENS R. Br., in Richards., Bot. App. Franklin Jour. 731. 1823.

Open rocky slopes, Greenland to Alaska, south to Quebec, South Dakota, and in the mountains to Colorado and California.

2. CALAMAGROSTIS RUBESCENS Buckl., Acad. Nat. Sci. Phila. Proc. 1862: 92. 1862.

Open pine woods and prairies, Manitoba to British Columbia south to northern Colorado and central California.

*3. CALAMAGROSTIS CANADENSIS (Michx.) Beauv., Ess. Agrost. 15, 152, 157. 1812.

Wet places and open woods; Greenland to Alaska, south to Maryland, North Carolina, Indiana, Kansas, New Mexico, and California.

4. CALAMAGROSTIS INEXPANSA A. Gray, Gram. and Cyp. 1: no. 20. 1834.

Wet meadows; Greenland to Alaska, south to Massachusetts, Indiana, Nebraska, New Mexico to California.

29. AGROSTIS L.

Slender perennials with flat or involute blades and dense or very open panicles of small spikelets; glumes equal, acute, longer than the floret; lemma much thinner than the glumes, awnless; palea minute or sometimes nearly as long as the lemma.

1. Palea well developed, half to two-thirds as long as the lemma.
    2. Glumes scabrous, obtuse; panicle contracted, densely flowered, the branches spikelet-bearing from the base.
        1. A. VERTICILLATA.
    2. Glumes scabrous only on the keel, acute; panicles open or if somewhat contracted, not densely flowered from the base.
        3. Panicles narrow, the branches appressed; long stolons developed, especially in isolated plants; culms decumbent at the base with relatively short blades.
            2. A. PALUSTRIS.
        3. Panicles open, the branches ascending or spreading; stolons wanting; culms erect, leafy - - 3. A. ALBA.
1. Palea obsolete, or a small nerveless scale.
    4. Plants spreading by long slender creeping rhizomes.
        4. A. DIEGOENSIS.
    4. Plants without rhizomes.
        5. Panicles narrow, contracted, at least some of the branches spikelet-bearing from the base.

6. Culms slender, 10-20 cm. tall, densely tufted; panicle narrow but loosely flowered, 2-6 cm. long, tinged with purple - - - - - - - - - 5. A. ROSSAE.

6. Culms usually coarse, more than 20 cm. tall; panicle densely flowered, often lobed, as much as 25 cm. long, green - - - - - - - - - - - - 6. A. EXARATA.

5. Panicles open, the branches naked at the base.

7. Panicles diffuse, the capillary scabrous branches branching above the middle - - - - 7. A. SCABRA.

7. Panicles open but not diffuse, the branches usually branching at or below the middle.

8. Spikelets 1.5 mm. long; culms slender, 10-30 cm. tall; plants of high altitudes.

8. A. IDAHOENSIS.

8. Spikelets 2-3 mm. long; culms coarser, 60-90 cm. tall; plants of low and medium altitudes.

9. A. OREGONENSIS.

*1. AGROSTIS VERTICILLATA Vill.; Prosp. Pl. Dauph. 16. 1779.

Wet ground, especially along streams and ditches; Washington, Oregon, Utah, and Nevada; Texas to California; introduced from Europe.

*2. AGROSTIS PALUSTRIS Huds., Fl. Angl. 27. 1762.

In damp places and along streams and ditches; Newfoundland to Maryland, British Columbia to northern California; introduced from the Old World.

*3. AGROSTIS ALBA L., Sp. Pl. 63. 1753; ed. 2. 1: 93. 1762.

Moist ground and waste places; throughout the cooler regions of North America, apparently introduced from the Old World.

*4. AGROSTIS DIEGOENSIS Vasey, Bull. Torrey Bot. Club 13: 55. 1886.

Mountain meadows and open woods, Montana and British Columbia to Nevada and southern California.

*5. AGROSTIS ROSSAE Vasey, Contrib. U. S. Natl. Herb. 3: 76. 1892.

Mountain meadows and slopes at high altitudes, Alberta; Montana to Washington, south to Colorado and California.

*6. AGROSTIS EXARATA Trin., Gram. Unifl. 207. 1824.

Moist ground; Nebraska to Alberta and Alaska south to Mexico.

*7. AGROSTIS SCABRA Willd., Sp. Pl. 1: 370. 1797.

Moist ground; Newfoundland to Alaska, south to Maryland, Illinois, Nebraska, New Mexico, and California, rarely in the southeastern states. This species has been referred by authors to A. hiemalis (Walt.) B.S.P., which is a distinct species confined to the southeastern states.

*8. AGROSTIS IDAHOENSIS Nash, Bull. Torrey Bot. Club 24: 42. 1897.

Mountain meadows, at medium and high altitudes, western Montana to Washington, south to New Mexico and California.

*9. AGROSTIS OREGONENSIS Vasey, Bull. Torrey Bot. Club 13: 55. 1886.

Marshes, bogs, and wet meadows, Montana to British Columbia,

south to Wyoming and California.

30. CINNA L.

Tall perennials with long open panicles and broad flat blades. Spikelets 1-flowered, disarticulating below the glumes, the rachilla produced behind the palea as a minute bristle; glumes nearly equal, 1-nerved; lemmas about as long as the glumes, 3-nerved, short-awned from the back just below the apex.

*1. CINNA LATIFOLIA (Trevir.) Griseb., in Ledeb., Fl. Ross. 4: 435. 1853.

Moist woods, Newfoundland and Labrador to Alaska, south to Connecticut, in the mountains to North Carolina, to Michigan, Illinois, South Dakota, and in the mountains to northern New Mexico and Utah to central California.

31. ALOPECURUS L.

Semi-aquatic perennial with flat blades and soft, spikelike panicle; glumes equal, united at the base, ciliate on the keel; lemma about as long as the glumes, the margins united at the base, bearing from below the middle a straight, included awn; palea wanting.

*1. ALOPECURUS AEQUALIS Sobol., Fl. Petrop. 16. 1799.

In bogs and wet ground; Greenland to Alaska south to Pennsylvania, Kansas, New Mexico, and California.

32. POLYPOGON Desf.

Decumbent annual with flat, scabrous blades, and dense, narrow or spikelike panicle. Glumes equal, minutely lobed, awned from between the lobes, the awns slender, longer than the glumes; lemma thin, hyaline, about half as long as the glumes.

*1. POLYPOGON MONSPELIENSIS (L.) Desf., Fl. Atlant. 1: 67. 1798.

Waste places; New Brunswick to Alaska, south to Virginia, mostly near the coast, common in the western states from Washington to Nebraska, south to Texas and California, introduced from Europe.

33. PHLEUM L.

Densely tufted perennials with flat blades and dense cylindric panicles; glumes equal, abruptly awned, keeled, the keels ciliate; lemma much shorter than the glumes, hyaline, truncate; palea narrow, a little shorter than the lemma.

Culms mostly more than 50 cm. tall, erect from a swollen bulblike base; panicle narrow, several times longer than wide.

1. P. PRATENSE.

Culms 20-50 cm. tall from a decumbent somewhat creeping base; panicle usually not more than twice as long as wide; bristly.

2. P. ALPINUM.

*1. PHLEUM PRATENSE L., Sp. Pl. 59. 1753.

Wet ground; escaped from cultivation throughout the United States, introduced from the Old World.

*2. PHLEUM ALPINUM L., Sp. Pl. 59. 1753.

Wet meadows at higher altitudes; Greenland to Alaska, south to New Hampshire, Michigan, and in the western states to New Mexico and California.

34. MUHLENBERGIA Schreb.

Annuals or usually perennials, tufted or rhizomatous, with simple or branching culms and narrow or open panicles; glumes usually much shorter than the lemma or sometimes as long as the lemma in robust species with narrow panicles; lemma firm, 3-nerved, with a very short, usually minutely pilose callus, awned or sometimes only mucronate.

1. Plants annual. Panicles narrow; lemma awnless.

1. M. FILIFORMIS.

1. Plants perennial.

2. Plants with prominent scaly creeping rhizomes.

3. Panicles open; spikelets on slender, rather long, usually

spreading pedicels - - - - - - - - - 2. M. ASPERIFOLIA.

3. Panicles narrow, often condensed; spikelets short-pediceled.

4. Blades involute, or if flat, less than 2 mm. wide.

5. Culms widely creeping; blades conspicuously recurved spreading - - - - - - - - 3. M. UTILIS.

5. Culms erect or decumbent at the base, but not widely creeping.

6. Culms nodulose-roughened; glumes about half as long as the floret; ligule 2-3 mm. long - - - - - - - - - 4. M. RICHARDSONIS.

6. Culms glabrous or pubescent, but not nodulose.

7. Lemma mucronate or short-awned; plants forming dense cushions, the leaves crowded toward the base.

5. M. THURBERI.

7. Lemma with an awn 1-3 mm. long; plants forming loose bunches, the leaves not crowded toward the base.

6. M. CURTIFOLIA.

4. Blades flat, at least some of them more than 3 mm. wide, lax, spreading.

8. Callus hairs copious, as long as the lemma; panicle silky, often tinged with purple.

7. M. ANDINA.

8. Callus hairs rather sparse, not more than half as long as the lemma.

9. Glumes awned, the awns exceeding the awnless floret; panicle compact, bristly - - - - - - - - - - - 8. M. RACEMOSA.

9. Glumes acuminate or awn-pointed but not exceeding the lemma; panicles not bristly - - - - - - - - - 9. M. FOLIOSA.

2. Plants tufted, rhizomes wanting.

10. Panicles narrow, dense or spikelike, the branches floriferous from the base.

11. Panicles spikelike - - - - - - - - - 10. M. RIGENS.

11. Panicles dense but loosely flowered, never spikelike - - - - - - - - - - - - 11. M. LONGILIGULA.

10. Panicles open, the branches naked at the base; culms wiry, freely branching, geniculate, widely spreading - - - - - - - - - - - - - 12. M. PORTERI.

*1. MUHLENBERGIA FILIFORMIS (Thurb.) Rydb., Bull. Torrey Bot. Club 32: 600. 1905.

Meadows and wet places in the mountains; South Dakota and British Columbia, south to Kansas, New Mexico, and California.

*2. MUHLENBERGIA ASPERIFOLIA (Nees and Mey.) Parodi, Univ. Nac. Buenos Aires Rev. Agron. 6: 117. f. 1. 1928.

Sporobolus asperifolius Nees, Nov. Act. Acad. Caes. Leop. Carol. 19: Sup. 1: 9. 1841: 141. 1843.

Dry hills or moist ground; Wisconsin to British Columbia south to Mexico; southern South America.

3. MUHLENBERGIA UTILIS (Torr.) Hitchc., Jour. Wash. Acad. Sci. 23: 453. 1933.

Low moist ground, Texas, Nevada, Arizona, and southern California; Mexico. (As M. repens (Presl) Hitchc., in Tidestrom, Flora of Utah and Nevada)

*4. MUHLENBERGIA RICHARDSONIS (Trin.) Rydb., Bull. Torrey Bot. Club 32: 600. 1905.

Muhlenbergia squarrosa Rydb., Bull. Torrey Bot. Club 36: 531. 1909.

Low open ground; New Brunswick to Alberta, south to South Dakota, New Mexico, and California; Mexico.

5. MUHLENBERGIA THURBERI Rydb., Bull. Torrey Bot. Club 32: 601. 1905.

Dry slopes and sandy ground; Texas, New Mexico, Nevada, and Arizona.

*6. MUHLENBERGIA CURTIFOLIA Scribn., Bull. Torrey Bot. Club 38: 328. 1911.

Moist or rocky open slopes, rare; Utah, Nevada, and Arizona.

*7. MUHLENBERGIA ANDINA (Nutt.) Hitchc., U. S. Dept. Agr. Bull. 772: 145. 1920.

Moist open ground; Montana and Washington to New Mexico and California.

8. MUHLENBERGIA RACEMOSA (Michx.) B.S.P., Prel. Cat. N. Y. 67. 1888.

Moist ground in canyons and meadows; Newfoundland to British Columbia, south to Maryland, Kentucky, Oklahoma, and Arizona.

9. MUHLENBERGIA FOLIOSA (Roem. & Schult.) Trin., Gram. Unifl. 190. 1824.

In springy soil along creeks; Maine and Quebec to Washington, south to North Carolina, Arkansas, New Mexico, and Arizona.

10. MUHLENBERGIA RIGENS (Benth.) Hitchc., Jour. Wash. Acad. Sci. 23: 453. 1933.

Epicampes rigens Benth., Jour. Linn. Soc. Bot. 19: 88. 1881.

Open slopes, canyons, and forests; Texas to Nevada and southern California; northern Mexico.

11. MUHLENBERGIA LONGILIGULA Hitchc., Amer. Jour. Bot. 21: 136. 1934.

Epicampes ligulata Scribn.; Vasey, Contrib. U. S. Natl. Herb. 3: 58. 1892.

Canyons and rocky slopes; western New Mexico, Arizona, southern Nevada and northern Mexico.

12. MUHLENBERGIA PORTERI Scribn.; Beal, Grasses N. Amer. 2: 259. 1896.

Mesas and rocky slopes; Colorado and Nevada to western Texas, California and northern Mexico.

35. SPOROBOLUS R. Br.

Annuals or perennials with open or spikelike panicles of small spikelets; glumes equal or usually unequal, the second often as long as the lemma; lemma membranaceous, 1-nerved, awnless; palea as long as the lemma; caryopsis free from the lemma and palea.

1. Plants annual. Glumes pubescent, the pubescence sometimes sparse; pedicels slender, spreading, club-shaped below the spikelets - - - - - - - - - - - - - - 1. S. MICROSPERMUS.
1. Plants perennial.
    2. Sheaths with a conspicuous tuft of hairs at the summit.
        3. Panicles open, the branches spreading, naked at the base.
            4. Panicle branches loosely flowered, the branchlets and pedicels implicate, spreading. 2. S. FLEXUOSUS.
            4. Panicle branches densely flowered, the branchlets and short pedicels appressed.
                5. Base of plant a close tuft - 3. S. CRYPTANDRUS.
                5. Base of plant a cluster of knotty rhizomes. Culms erect, slender, mostly less than 30 cm. tall; blades short, involute, spreading - - - - - - - - - - - - - 4. S. NEALLEYI.
        3. Panicles contracted, spikelike - - - 5. S. CONTRACTUS.

2. Sheaths glabrous or nearly so at the mouth; panicle loose, 1 to 2 times as long as broad, the branches naked below, the branchlets spreading; blades mostly involute.

6. S. AIROIDES.

*1. SPOROBOLUS MICROSPERMUS (Lag.) Hitchc., Jour. Wash. Acad. Sci. 23: 453. 1933.

Dry or usually moist open ground and borders of marshes; Nebraska to Montana and eastern Washington, south to Costa Rica.

2. SPOROBOLUS FLEXUOSUS (Thurb.) Rydb., Bull. Torrey Bot. Club 32: 601. 1905.

Dry or moist, open sandy soil; western Texas to southern Utah and southeastern California; northern Mexico and the West Indies to Argentina.

*3. SPOROBOLUS CRYPTANDRUS (Torr.) A. Gray, Man. 576. 1848.

Dry open sandy ground and rocky slopes; Maine and Ontario to Alberta and Washington, south to North Carolina, Indiana, Louisiana, Arizona, and Mexico.

4. SPOROBOLUS NEALLEYI Vasey, Bull. Torrey Bot. Club 15: 49. 1888, name only; Contrib. U. S. Natl. Herb. 1: 57. 1890.

Sandy ground, western Texas, New Mexico, and Nevada.

5. SPOROBOLUS CONTRACTUS Hitchc., Amer. Jour. Bot. 2: 303. 1915.

Dry mesas, bluffs, and sandhills; Colorado to Nevada, south to western Texas, southeastern California and Sonora.

*6. SPOROBOLUS AIROIDES (Torr.) Torr., U. S. Rept. Expl. Miss. Pacif. 7: 21. 1856.

Dry hills and open ground, along ditches and in alkaline soil; South Dakota to eastern Washington, south to Texas and southern California.

36. ORYZOPSIS Michx.

Slender perennials with flat or involute blades and narrow or open panicles; glumes equal, gradually or abruptly acuminate; lemma firm, terete, glabrous or villous, with a short rather blunt callus, and a short straight or weakly geniculate, deciduous awn.

Lemma 2 mm. long, glabrous or sometimes pubescent.

Panicles open with slender spreading branches.

1. O. MICRANTHA.

Lemma 3-6 mm. long, densely pubescent or villous.

Panicles narrow, with short appressed branches; culms 15-30 mm. tall.

Lemma pubescent, 4 mm. long; awn 5 mm. long, strongly geniculate - - - - - - - - - - - - - - - - 2. O. EXIGUA.

Lemma villous, 6 mm. long; awn about 6 mm. long, straight or nearly so - - - - - - - - - - - - - - - 3. O. WEBBERI.

Panicles open, the branches spreading, naked toward the base; culms 30-60 cm. tall.

Pedicels appressed, straight; lemma 6 mm. long.

4. O. BLOOMERI.

Pedicels divaricately spreading, flexuous; lemma about 3 mm. long - - - - - - - - - - - - - - - 5. O. HYMENOIDES.

1. ORYZOPSIS MICRANTHA (Trin. & Rupr.) Thurb., Acad. Nat. Sci. Phila. Proc. 1863: 78. 1863.

Rocky slopes and dry, open woods; Saskatchewan to Montana, south to New Mexico and Arizona.

2. ORYZOPSIS EXIGUA Thurb., in Wilkes, U. S. Expl. Exped. Bot. 17: 481. 1874.

Dry open ground and open woods, Montana to Washington, south to Colorado, and Nevada.

*3. ORYZOPSIS WEBBERI (Thurb.) Benth.; Vasey, Grasses U. S. 23: 1883.

Deserts and plains, Colorado, Nevada, and California.

4. ORYZOPSIS BLOOMERI (Boland.) Ricker; Piper, Contrib. U. S. Natl. Herb. 11: 109. 1906.

Dry sandy ground, Montana to eastern Washington, south to New Mexico and California.

*5. ORYZOPSIS HYMENOIDES (Roem. and Schult.) Ricker; Piper, Contrib. U. S. Natl. Herb. 11: 109. 1906.

Deserts, plains, and open rocky slopes, Manitoba to British Columbia, south to northern Mexico.

37. STIPA L.

Tufted perennials with usually involute blades and narrow or sometimes open panicles; spikelets disarticulating above the glumes, the articulation oblique, leaving a sharp, bearded callus on the floret; glumes equal, thin, narrow, longer than the floret; lemma indurate, terete, terminating in a prominent geniculate awn, twisted below.

1. First segment of the once geniculate awn conspicuously plumose with hairs 5-8 mm. long - - - - - - - - - - - 1. S. SPECIOSA.
1. First segment of the awn scabrous or, if plumose, the hairs not more than 2 mm. long.
    2. Lemma densely villous with white hairs 3-4 mm. long. 2. S. CORONATA VAR. DEPAUPERATA.
    2. Lemma pubescent or villous, but the hairs not more than 2 mm. long.
        3. Lemma 8-12 mm. long with a long sharp-pointed callus, pilose in lines nearly to the summit. Glumes attenuate with hyaline tips - - - - - - 3. S. COMATA.
        3. Lemma usually not more than 7 mm. long, or if as much as 8 mm. long, then the awns plumose.
            4. Awns plumose on the two lower segments.
                5. Sheaths pubescent - - - - - - - - 4. S. ELMERI.
                5. Sheaths glabrous.
                6. Ligule 3-6 mm. long - - - 5. S. THURBERIANA.

6. Ligule very short (sometimes 1-2 mm. long in S. californica.)

7. Hairs on upper part of lemma much longer than those below.

6. S. CALIFORNICA.

7. Hairs short all over.

7. S. OCCIDENTALIS.

4. Awns scabrous.

8. Sheaths pubescent - - - - - - 8. S. WILLIAMSII.

8. Sheaths glabrous.

9. Lemma 6-7 mm. long; blades, or at least some of them usually flat, awns 2-3.5 cm. long - - - - - - - - 9. S. COLUMBIANA.

9. Lemma 4-5 mm. long; blades involute, mostly crowded toward the base.

10. Glumes about 6 mm. long; lemma densely pubescent, the hairs toward the summit not much longer than the rest - - - - - - - 10. S. LETTERMANI.

10. Glumes about 9 mm. long; lemmas villous, especially above the middle with hairs 2 mm. long.

11. S. PINETORUM.

*1. STIPA SPECIOSA Trin. and Rupr., Mem. Acad. St. Petersb. VI. Sci. Nat. 5(1): 45. 1842.

Dry rocky hills and canyons; Colorado and Nevada to Arizona and southern California; southern South America.

2. STIPA CORONATA VAR. DEPAUPERATA (Jones) Hitchc., Jour. Wash. Acad. Sci. 24: 292. 1934.

Dry or rocky slopes; Utah and Nevada to Arizona and southern California.

*3. STIPA COMATA Trin. and Rupr., Mem. Acad. St. Petersb. VI. Sci. Nat. 5(1): 75. 1842.

Dry hills, open woods and sandy soil; Indiana to Yukon Territory, south to Texas and California.

*4. STIPA ELMERI Piper and Brodie; Scribn., U. S. Dept. Agr., Div. Agrost. Bull. 11: 46. 1898.

Dry hills, sandy plains and open woods, Idaho and Washington to Nevada and California.

*5. STIPA THURBERIANA Piper, U. S. Dept. Agr., Div. Agrost. Circ. 27: 10. 1900.

Rocky slopes, Idaho and Washington to Nevada and central California.

*6. STIPA CALIFORNICA Merr. and Davy, Univ. Calif. Pubs., Bot. 1: 61. 1902.

Dry open ground, Washington to California and western Nevada.

*7. STIPA OCCIDENTALIS Thurb.; S. Wats., in King, Geol. Expl. 40th Par. 5: 380. 1871.

Plains, rocky hills, and open woods, Wyoming to Washington, south to Arizona (Yucca) and California.

8. STIPA WILLIAMSII Scribn., U. S. Dept. Agr., Div. Agrost. Bull. 11: 45. 1898.

Dry hills and plains, Montana to Washington, south to Colorado and California.

*9. STIPA COLUMBIANA Macoun, Cat. Can. Pl. 2(4): 191. 1888.

Stipa minor (Vasey) Scribn., U. S. Dept. Agr., Div. Agrost. Bull. 11: 46. 1898.

Dry plains and open woods; Wyoming to Yukon Territory, south to Texas and California.

10. STIPA LETTERMANI Vasey, Bull. Torrey Bot. Club 13: 53. 1886.

Open ground and open woods; Wyoming to Montana and Oregon, south to New Mexico and California.

11. STIPA PINETORUM Jones, Calif. Acad. Sci. Proc. II. 5: 724. 1895.

Open pine woods at high altitudes, Colorado, Utah, Nevada, and California.

38. ARISTIDA L.

Tufted annuals or perennials with firm, usually involute blades and narrow or open panicles; glumes equal or unequal, acute, acuminate or awn-tipped; lemma indurate with a sharp

bearded callus, 3-awned, the lateral awns sometimes much reduced, the base sometimes undivided, twisted, forming a column.

Plants annual. Awns 10-15 mm. long, flattened at the base.

1. A. ADSCENSIONIS.

Plants perennial.

First glume one-half to two-thirds as long as the second, lemma narrowed into a slender beak 5-6 mm. long.

Awns 1.5-2.5 cm. long, widely spreading - - - 2. A. GLAUCA.

Glumes nearly equal or the first sometimes a little longer, column of awn straight or obscurely twisted; panicle somewhat open, the branches rather distant, stiffly ascending, naked at the base - - - - - - - - - - - - - - 3. A. PARISHII.

1. ARISTIDA ADSCENSIONIS L., Sp. Pl. 82. 1753.

Dry mesas, deserts and rocky slopes; western Missouri and Texas to California and southward; also in warmer parts of the Old World.

2. ARISTIDA GLAUCA (Nees) Walp., Ann. Bot. (London) 1: 925. 1849.

Dry rocky slopes and plains; western Texas to Utah, Nevada and southern California, south to central Mexico.

3. ARISTIDA PARISHII Hitchc., in Jepson, Fl. Calif. 1: 101. 1912.

Dry rocky hills; Nevada, Arizona, and southern California.

39. HILARIA H.B.K.

Stiff perennials with solid culms and narrow blades, the groups of spikelets in rather narrow dense terminal spikes; spikelets in groups of three, the central spikelet fertile, 1-flowered, the lateral staminate, 2-flowered; glumes of the three spikelets firm, forming a false involucre; lemma and palea equal, hyaline.

Culms felty pubescent - - - - - - - - - - - - - - - - - - 1. H. RIGIDA.
Culms glabrous - 2. H. JAMESII.

1. HILARIA RIGIDA (Thurb.) Benth.; Scribn., Bull. Torrey Bot. Club 9: 86. 1882.

   Deserts, plains, and rocky hills; southern Utah and Nevada to southern California and Sonora.

2. HILARIA JAMESII (Torr.) Benth., Jour. Linn. Soc. Bot. 19: 62. 1881.

   Dry hills, rocky canyons, and sandy plains; Wyoming to Nevada, south to Texas and California (Inyo County).

40. LEPTOCHLOA Beauv.

Annual with flat blades and numerous spikes scattered along the common axis; spikelets few to several-flowered, the upper floret reduced to a small awnless rudiment; glumes 1-nerved, the second usually longer and broader than the first; lemmas acute,

awned, pubescent or pilose on the nerves.

*1. LEPTOCHLOA FASCICULARIS (Lam.) A. Gray, Man. 588. 1848.

Along ditches and in moist waste places, often in brackish marshes, throughout the United States; Mexico and the West Indies to Argentina.

41. CYNODON L. Rich.

Stoloniferous perennial with narrow, often short blades and few to several, slender, digitate spikes; spikelets 1-flowered, prolonged beyond the spikelet in a naked stipe; glumes subequal, the first lunate, the second lanceolate; lemma acute, awnless, pubescent on the nerves; palea as long as the lemma.

*1. CYNODON DACTYLON (L.) Pers., Syn. Pl. 1: 85. 1805.

Capriola dactylon Kuntze, Rev. Gen. Pl. 2: 764. 1891.

Lawns and waste places, New Hampshire to Michigan, south to Florida and southern California; introduced in America.

42. BECKMANNIA Host

Leafy annual grasses with numerous short thick spikes crowded in a dense elongate panicle. Spikelets 1-flowered, subsessile, imbricate in two rows on one side of a narrow, flattened rachis, suborbicular, falling entire; glumes equal, acute or apiculate,

inflated, enclosing the floret; lemma equalling or slightly exceeding the glumes, crescent-shaped, acuminate, glabrous.

*1. BECKMANNIA SYZIGACHNE (Steud.) Fernald, Rhodora 30: 27. 1928.

Marshes and ditches, Manitoba to Alaska, south to Illinois, Kansas, New Mexico, and California; New York, Ohio; Asia. (As B. erucaeformis (L.) Host, in Tidestrom, Flora of Utah and Nevada)

43. SPARTINA Schreb.

Rather coarse perennial with strong, scaly rhizomes, and several ascending or spreading spikes, racemose on a common axis, the rachis produced beyond the spikelets; spikelets 1-flowered, disarticulating below the glumes; first glume shorter, the second longer, than the floret; lemma firm, but thinner than the glumes, keeled, subobtuse; palea as long as, or longer, than the lemma with thin, very wide margins.

*1. SPARTINA GRACILIS Trin., Mem. Acad. St. Petersb. VI. Sci. Nat. 41: 110. 1840.

Plains and alkaline soil; Saskatchewan to British Columbia, south to Kansas, Arizona, and California.

44. CHLORIS Swartz

Annual, with several digitate spikes; spikelets with one perfect floret, the rachilla prolonged beyond the floret, bearing a club-shaped rudiment composed of one or more reduced sterile lemmas; fertile lemma 3-nerved, awned from the back, just below the tip.

1. CHLORIS VIRGATA Swartz, Fl. Ind. Occ. 1: 203. 1797.

A common weed in open ground and waste places; Nebraska to Texas, west to Nevada and southern California, introduced in a few eastern localities; tropical America.

45. BOUTELOUA Lag.

Cespitose or sometimes stoloniferous annuals or perennials with slender culms, and, one to many, short 1-sided spikes, racemose on a short or often elongated axis; spikelets with one fertile floret, and one or two rudimentary florets above it; fertile lemma 3-nerved, the tip variously lobed or dentate, the nerves usually excurrent in short awns; rudiment reduced to 3 awns, or glumaceous and lobed or dentate with 3 usually conspicuous awns.

Spikes persistent; spikelets pectinate.

Plants annual - - - - - - - - - - - - - - - - - - - 2. B. BARBATA.

Plants perennial.

Rachis produced beyond the spikelets, pointed; second glume tuberculate hispid - - - - - - - - - - - - 3. B. HIRSUTA.

Rachis terminating in a spikelet, this often rudimentary; second glume glabrous, scabrous, or pubescent (sparsely papillose-pilose in B. gracilis.)

Spikes normally 2, rarely 1 or 3; second glume sparsely papillose-pilose - - - - - - - - - 4. B. GRACILIS.

Spikes 3 to 8; second glume not at all papillose-pilose - - - - - - - - - - - - - - - - - 5. B. TRIFIDA.

Spikes deciduous, falling entire; spikelets not pectinate. Plants annual - 1. B. ARISTIDOIDES.

1. BOUTELOUA ARISTIDOIDES (H.B.K.) Griseb., Fl. Brit. W. Ind. 537. 1864.

Deserts, dry mesas, and rocky hillsides; Texas to southern California and northern Mexico; Argentina.

2. BOUTELOUA BARBATA Lag., Var. Cienc. 2(4): 141. 1805.

Dry mesas, open ground and rocky hills; southern Utah; Texas to southeastern California and Mexico.

3. BOUTELOUA HIRSUTA Lag., Var. Cienc. 2(4): 141. 1805.

Open ground and dry, rocky hills; Wisconsin and South Dakota to Texas, Colorado, Arizona, southern California, and Mexico.

4. BOUTELOUA GRACILIS (H.B.K.) Lag.; Steud., Nom. Bot. ed. 2. 1: 219. 1840.

Dry plains; Wisconsin to Manitoba and Alberta, south to

Missouri, Texas, southern California, and Mexico.

5. BOUTELOUA TRIFIDA Thurb., in S. Wats., Amer. Acad. Sci. Proc. 18: 177. 1883.

Mesas and dry rocky hillsides; Texas to southwestern Utah, southern California and Mexico.

46. MUNROA Torr.

Freely branching widely decumbent spreading annual with short, firm, pungent blades and short spikes hidden in the crowded sheaths at the ends of the branches; spikes composed of 2 or 3 spikelets, the lower one or two, 2- to 3-flowered, the upper 4- to 5-flowered; glumes of lower spikelet equal, 1-nerved, those of the upper much shorter, the first about half as long as the second; lemmas 3-nerved, excurrent in short awns, the central awn longer and stouter than the lateral ones.

1. MUNROA SQUARROSA (Nutt.) Torr., U. S. Rept. Expl. Miss. Pacif. 4(5): 158. 1857.

Open plains and hills, Alberta to Texas and Arizona.

47. PHALARIS L.

Annuals or perennials with flat blades and erect, spikelike, sometimes interrupted panicles; spikelets laterally compressed, with one fertile floret, and one or two much reduced sterile

florets below the fertile one; fertile lemma coriaceous, shorter than the glumes.

Plants perennial with creeping rhizomes; panicle interrupted below, the branches spreading in anthesis - - - - - 1. P. ARUNDINACEA.

Plants annual; panicles mostly 2-6 cm. long, tapering to each end; glumes 5-6 mm. long - - - - - - - - - - - - - 2. P. CAROLINIANA.

1. PHALARIS ARUNDINACEA L., Sp. Pl. 55. 1753.

Moist places, New Brunswick to southeastern Alaska, south to North Carolina, Kentucky, Oklahoma, New Mexico, Arizona, and northeastern California; Eurasia.

2. PHALARIS CAROLINIANA Walt., Fl. Carol. 74. 1788.

Moist ground; Virginia to Colorado, south to Florida and Texas, west to Arizona, California, and Oregon.

48. DIGITARIA Heist.

Decumbent spreading annual with flat blades and rather slender ascending or spreading, digitate racemes; spikelets usually in pairs on one side of a flat, winged rachis; first glume evident; second glume shorter than the sterile lemma, exposing the fruit, more or less pubescent; fertile lemma cartilaginous, pale, with hyaline margins.

1. DIGITARIA SANGUINALIS (L.) Scop., Fl. Carn. ed. 2. 1: 52. 1772.

Syntherisma sanguinalis Dulac, Fl. Haut. Pyr. 77. 1867.

A weed in waste places in temperate and tropical regions of the world.

49. PASPALUM L.

Perennial with flat blades and two paired racemes; spikelets solitary in two rows on one side of the rachis; first glume usually wanting, developed in occasional spikelets; second glume and sterile lemma equal, covering the fruit; fertile lemma indurate, smooth, subobtuse.

1. PASPALUM DISTICHUM L., Syst. Nat. ed. 10. 2: 855. 1759.

Moist ground along streams and ditches; New Jersey to Florida, west in the southern states to California, and north in the western states to Idaho and Washington.

50. PANICUM L.

Annuals or perennials with the spikelets usually in open panicles; first glume minute to more than half as long as the spikelet; second glume and sterile lemma equal, usually covering the fruit, the sterile lemma sometimes enclosing a staminate flower; fertile lemma indurate, typically obtuse.

Plants annual; panicles usually more than half the height of the culm, the branches stiffly spreading.

3. P. CAPILLARE VAR. OCCIDENTALE.

Plants perennial; panicles less than half the height of the culm.

Rhizomes wanting; basal leaves distinctly different from those of the culm, forming a winter rosette; culms at first simple, later becoming much branched - - - 1. P. PACIFICUM.

Rhizomes present; basal leaves similar to those of the culm, not forming a winter rosette - - - - - - - 2. P. VIRGATUM.

1. PANICUM PACIFICUM Hitchc. and Chase, Contrib. U. S. Natl. Herb. 15: 229. f. 241. 1910.

Sandy shores and slopes and moist crevices of rocks, Idaho to British Columbia, south to Arizona and southern California.

2. PANICUM VIRGATUM L., Sp. Pl. 59. 1753.

Moist canyons and open, sometimes rocky ground; Quebec and Maine to Montana, south to Central America.

*3. PANICUM CAPILLARE VAR. OCCIDENTALE Rydb., Contrib. U. S. Natl. Herb. 3: 186. 1895.

Panicum barbipulvinatum Nash, in Rydb., Mem. N. Y. Bot. Gard. 1: 21. 1900.

Moist open ground; Prince Edward Island to British Columbia, south to New Jersey, Missouri, Texas, and California, rare in the East.

51. ECHINOCHLOA Beauv.

Slender or stout annuals with flat blades, and few to several spikelike racemes along a common axis. Spikelets hispid, densely arranged on one side of the rachis; first glume acute, about half as long as the spikelet; second glume and sterile lemma equal, pointed, the lemma often with a long conspicuous awn.

1. ECHINOCHLOA CRUSGALLI (L.) Beauv., Ess. Agrost. 53, 161. 1812.

   Moist ground along ditches and in waste places; New Brunswick to Washington, south to Florida and California; temperate and subtropical regions of both hemispheres.

52. SETARIA Beauv.

Annual with flat blades and spikelike panicle; spikelets subtended by 1 or more scabrous bristles, the spikelets deciduous, the bristles persistent; first glume broad, less than half as long as the spikelet; second glume and sterile lemma equal or the glume a little shorter; fruit finely crosslined or nearly smooth.

1. SETARIA VIRIDIS (L.) Beauv., Ess. Agrost. 51, 178. 1812.

   Chaetochloa viridis Scribn., U. S. Dept. Agr., Div. Agrost. Bull. 4: 39. 1897.

   Fields and open woods and waste places, temperate regions of both hemispheres; introduced from Europe.

53. CENCHRUS L.

Decumbent or geniculate spreading annual with flat blades and rather dense, spikelike racemes of burs. Burs composed of numerous coalescing bristles enclosing 2 to 4 spikelets, falling entire; first glume usually half to two-thirds as long as the spikelet; second glume and sterile lemma equal, subacute or acuminate; fruit acuminate, about as long as the second glume and sterile lemma.

1. CENCHRUS PAUCIFLORUS Benth., Bot. Voy. Sulph. 56. 1840.

   Open sandy ground; Maine to Oregon, south to Mexico; coastal regions of tropical America and southern South America.

54. IMPERATA Cyrillo

Slender erect perennials from hard scaly rhizomes, with linear blades narrowed toward the base to the thickened midrib, and narrow terminal silky panicles; spikelets all alike, paired, awnless, unequally pedicellate on a continuous rachis, surrounded by long silky hairs; glumes about equal, membranaceous; sterile lemma, fertile lemma, and palea thin and hyaline.

1. IMPERATA HOOKERI Rupr., in Anderss., Öfv. Svensk. Vet. Akad. Förh. 12: 160. 1855.

   Desert regions, western Texas to Nevada, and southern California; Mexico.

55. ANDROPOGON L.

Perennials with flat or folded blades and few to numerous racemes, these solitary, paired, digitate, or several to numerous, approximate on a short or somewhat elongated axis; sessile spikelet perfect, the pedicellate one staminate and similar to the sessile or sterile and much reduced; glumes of the fertile spikelet coriaceous, the first rounded, flat, or concave on the back, several-nerved; sterile lemma shorter than the glumes, empty, hyaline; fertile lemma hyaline, narrow, entire or bifid, usually bearing from the tip a bent and twisted awn. Racemes solitary, paired, or digitate; culms branching toward the summit.

Racemes paired or digitate on each peduncle - - 1. A. GLOMERATUS.
Racemes few to numerous, approximate on a relatively long axis; culms sparingly branched from the base only.
2. A. BARBINODIS.

1. ANDROPOGON GLOMERATUS (Walt.) B.S.P., Prel. Cat. N. Y. 67. 1888.

Moist ground and rocky slopes; Massachusetts to Florida, north to Kentucky and southern California.

2. ANDROPOGON BARBINODIS Lag., Gen. and Sp. Nov. 3, 1816.

Open sandy or gravelly ground and rocky slopes; Oklahoma and Texas to California; Mexico. (As A. saccharoides Swartz, in Tidestrom, Flora of Utah and Nevada).